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РЕДКИЕ ВИДЫ ОРХИДНЫХ (ORCHIDACEAE) ВО ФЛОРЕ ВЬЕТНАМА

RARE SPECIES OF ORCHIDS (ORCHIDACEAE) IN THE FLORA OF VIETNAM

В статье приводятся новые местонахождения 186 редких видов орхидных из 72 родов, собранных на территории Вьетнама во время полевых работ 1998–1999 годов, а также обнаруженных в гербариях и частных коллекциях СРВ и России. Четыре рода (*Bletilla*, *Stereosandra*, *Thunia*, *Yoania*) и 29 видов (*Bletilla ochracea*, *Bulbophyllum macraei*, *B. modestum*, *B. parviflorum*, *B. schweliense*, *B. striatitepalum*, *Chiloschista trudelii*, *Calanthe mannii*, *Coelogyne malipoensis*, *Coelogyne schultesii*, *Cryptochilus lutea*, *Cymbidium erythraeum*, *C. lowianum*, *Eria carinata*, *Goodyera viridiflora*, *Holcoglossum wangii*, *Nervilia punctata*, *Panisea yunnanensis*, *Paphiopedilum dianthum*, *P. henryanum*, *P. micranthum*, *Phaius longicruris*, *Pholidota missionariorum*, *Ph. yunnanensis*, *Porpax lanii*, *Sarcoglyphis smithianus*, *Stereosandra javanica*, *Thunia alba*, *Yoania prainii*) найдены во Вьетнаме впервые.

В предлагаемой работе продолжается публикация (Аверьянов, 1988а, б, 1989, 1998, 1999, 2000а, б; Аверьянов, Ву Нгок Лонг, 1989; Аверьянов, Зыонг Дык Гуен, 1989, 1990; Averyanov, Dzuong Duc Huyn, 1993) местонахождений редких видов орхидных, собранных автором и его коллегами в труднодоступных горных областях Вьетнама во время полевых экспедиционных работ 1998–1999 г., проводимых в соответствии с научно-исследовательскими программами Американского общества исследователей орхидных (American Orchid Society) “Изучение вымирающей флоры орхидных труднодоступных горных известняковых районов северного Вьетнама” (“*Exploration of endangered calcium dependent orchid flora in inaccessible rocky limestone areas of the North Vietnam*”), Национального географического общества США (U.S.A. National Geographic Society) “Изучение флоры высокогорий южного Вьетнама” (“*Flora of Highlands of South Vietnam*”), “Флора известняков провинции Каобанг северного Вьетнама” (“*Limestone flora of Cao Bang province of North Vietnam*”) и Комитета охраны природы Общества исследователей орхидных г. Сан Диего (San Diego Orchid Society Conservation Committee) “Изучение вымирающих кальцефильных видов рода *Paphiopedilum* северного Вьетнама” (“*Exploration of endangered calcium dependent Paphiopedilum species in North Vietnam*”). Обширные гербарные материалы, собранные в ходе полевых работ при выполнении этих программ, в наиболее полном виде представлены в Гербариях Института Экологии и Биологических ресурсов Национального Центра Естественных наук и Технологии Вьетнама (HN) и Ботанического института им. В.Л.Комарова РАН (LE). Значительная часть

дублетов в рамках научного сотрудничества по изучению флоры Юго-Восточной Азии передана также на хранение в Гербарии Института биологических наук университета г. Орхус, Дания (AAU), Миссурийского Ботанического сада, США (МО) и Национального музея естественной истории, Франция (P).

В работу также включен ряд гербарных образцов, собранных иными экспедициями. В большинстве своем эти сборы поступили для хранения в Гербарий Института Экологии и Биологических ресурсов (HN) и были любезно предоставлены нам для исследования руководством этого учреждения.

Цитируемые гербарные образцы, собранные по программам *“Изучение вымирающей флоры орхидных труднодоступных горных известняковых районов северного Вьетнама”* и *“Флора известняков провинции Каобанг северного Вьетнама”*, обозначены на цитируемых этикетках индексом **“CBL”** (Cao Bang Limestones) с соответствующим номером. Номера коллекционных экземпляров, собранных по программе *“Изучение флоры высокогорий южного Вьетнама”*, имеют индекс **“VH”** (Vietnamese Highlands). Личный индекс д-ра Нгуен Тьен Хьепа (Dr. Nguyen Tien Hiep) – **“NTH”** широко использовался для обозначения коллекционных номеров многих экспедиций по программам Американского общества исследователей орхидных и Комитета охраны природы Общества исследователей орхидных г. Сан Диего. Индексом **“TD”** обозначены экземпляры, собранные во время небольшой экскурсии по горному хребту Там Дао (Tam Dao) по программе Американского общества исследователей орхидных. Индекс **“HS”** имеют номера гербария, собранного во время международной экспедиции в районе Хонг Сон (Huong Son). В ряде других экспедиций номера гербарных образцов обозначались следующими индексами: **“VA”** (Vietnamese-American expedition); **“DH”**, **“DKH”** – личный индекс д-ра Хардера (Dr. Daniel Harder); **“MAJ”** – личный индекс д-ра Алехандра Ярамилло (Dr. M. Alejandra Jaramillo); **“NMC”** – личный индекс д-ра Нгуен Мань Куонга (Dr. Nguyen Manh Cuong); **“DDS”** (ICBG project). В публикацию также включены не многочисленные, но интересные образцы орхидных, обнаруженные нами в разрозненных коллекциях ботанических учреждений и частных коллекциях СПб и России. Разумеется, культивируемые образцы орхидных учитывались лишь в случае полной уверенности, что эти растения были собраны на территории Вьетнама. Названия таксонов в списке расположены в алфавитном порядке. Для каждого цитируемого образца приводятся сокращенный унифицированный текст этикетки на языке оригинала и индекс гербария, в котором данный образец представлен. Названия таксонов приводимые для флоры Вьетнама впервые, отмечены звездочкой. В тексте этикеток приняты следующие сокращения: vicin. (vicinity), prov. (province), distr. (district) и mun. (municipality).

Редкие виды орхидных во флоре Вьетнама

1. *Acampe* Lindl.1.1. *A. rigida* (Buch.-Ham. ex J.E. Smith) P.F. Hunt

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 400 m, secondary evergreen forest on alluvial valley among limestone rocks on foothills of remnant limestone ridges. Lithophytic shrub on steep bluffs with pendant shoots up to 1.5 m lg, very common. 24 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 613* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 25 km to SSE from Cao Bang town, 22°27'N 106°22'E, 300–500 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Lithophytic shrub with shoots up to 1.5 m lg, very common on open rock outcrops and cliffs. 5 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 928* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, about 14 km from Cao Bang town to the N, 800 m, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophytic shrub up to 1 m hg on open rocks, common. 13 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1213* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic shrub up to 1 m hg on open mossy rocks, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3529* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Bong village. Epiphyte, 40–60 cm tall, flowers pale yellow, petals purple long spotty, labellum white. 26 VIII 1999, *N.M.Cuong, M.V.Sinh, H.L.Quyen, NMC 461* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 300–450 m. Primary broad-leaved evergreen dry forest on very steep rocky slopes of karst remnant limestone ridge. Lithophytic shrub up to 1.5 m hg on open cliffs, common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3797* (HN!, K, LE!).

2. *Aerides* Lour.2.2. *Ae. odorata* Lour.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Nga Doi, 18°30'N 105°14'E, 400 m, primary and secondary forest on schist. Epiphyte on tree, 19 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 719* (HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Bong village. Epiphytic herb, flowers white-pale brown. 14 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3001* (HN!).

2.3. *Ae. rosea* Lodd. ex Lindl. et Paxt.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary

mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3675* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N, 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic and epiphytic shrub with pendant shoots up to 1 m lg, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 708* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N, 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic and epiphytic shrub with shoots up to 0.6 m lg, not common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 895* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N, 106°18'E, about 14 km from Cao Bang town to the N, 800 m. Primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia*, along tops of limestone ridge. Epiphyte and lithophyte, abundant. 13 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1188* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N, 106°14'E, about 21 km from Cao Bang town to the N, 800–850 m, open secondary broad-leaved forest with bamboo along tops of remnant limestone ridge. Lithophyte and epiphyte, common. 9 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1014* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N, 106°14'E, about 21 km from Cao Bang town to the N, 850–900 m, open primary coniferous forest with *Pseudotsuga brevifolia*, along tops of remnant limestone ridge. Epiphyte, common. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1045* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., vicinity of Thang Heng and Lung Tao villages near Thang Heng lake, 700–950 m, open dry primary mixed forest with domination of *Pseudotsuga brevifolia* on tops of limestone mesas and ridges. Epiphytic and lithophytic shrublet in open dry forest and on open rocks near and on tops of mesas, flowers pink-violet, common. 25–27 V 1997, *L.Averyanov, N.T.Hiep, VH 4944* (AAU, HN!, LE!, MO, P).

3. *Agrostophyllum* Blume

3.4. *A. brevipes* King et Pantl.

N.Vietnam, Ha Giang prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N, 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte at the base of old mossy trees, not common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3595* (HN!, K, LE!). **N.Vietnam, Lao Cai** prov., **Than Uyen** distr., Ho Mit mun., 22°6'N, 103°52'E, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), 1400–1500 m, primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphytic herb on mossy trees, common. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2799* (HN!, LE!).

4. *Anoectochilus* Blume

4.5. *A. calcareus* Aver.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N, 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Terrestrial herb in shady places, leaves above deep brown-black with pinkish-white venation, pink below, rare. 19 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3682** (HN!, LE!). **N.Vietnam, Cao Bang** prov., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N, 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Terrestrial herb on shady very steep slopes and vertical bluffs, leaves velvety deep black-brown with silver-white nerves, rare. 19 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1583** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N, 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic and terrestrial herb in shady places, leaves deep velvety black-brown with pink-white venation above, uniformly pink-violet below, rare. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3573** (HN!, LE!).

4.6. *A. setaceus* Blume (= *A. roxburghii* Lindl.)

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N, 105°8'E, 35.9 km to 27° of Ha Giang town, 1400–1500 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Terrestrial creeping herb in shady places, leaves velvety green-brown with golden vein network, rare. 9 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3477** (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Ngam Thiep, 18°22'N, 105°13'E, 197–240 m. Herb 5–10 cm tall, weedy sand slope, leaves deep green. 23 V 1998, *N.T.Hiep*, *P.K.Loc*, *N.Q.Binh*, *L.Xiem*, **VA 857** (HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Mac village, Cuc Phuong national park. 11 IX 1999, *N.M.Cuong*, *M.V.Sinh*, *H.L.Quyen*, **NMC 518** (HN!).

5. *Arundina* Blume

5.7. *A. graminifolia* (D. Don) Hochr.

N.Vietnam, Ha Giang prov., secondary middle tall grasslands along road slopes near Dong Van town, 23°16'N, 105°21'E, very common all over the area. Tepals white with light pink tint, lip purple with yellow center. 5 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3342** (HN!, K, LE!).

6. *Biermannia* King et Pantl.

6.8. *B. calcarata* Aver.

N.Vietnam, Ha Tinh prov., **Huang Son** distr., Son Kim mun., along Rao An river, 18°24'N, 105°13'E, 260 m, primary evergreen broad-leaved mountain forest on

granite. Epiphyte on mossy trees, flowers yellowish-white, common. 14 June 1999, *N.T.Hiep, P.H.Hoang, D.Harder, L.Averyanov etc.*, **HS sine no** (LE!).

7. **Bletilla* Rchb. f.

7.9. **B. ochracea* Schlechter

N.Vietnam, Bac Can prov., **Ngan Son** distr., Wind Pass on road Hanoi – Cao Bang, 22°25'N 105°55'E, 700 m. Terrestrial herb with large underground tuber on wet clay-lateritic soil on shales among limestone rocks in open secondary shrubs and short tall grasslands, flowers not smelled, tepals pale yellowish-green, with pink-brown tint outside, lip pale yellowish-green with numerous purple spots, column and anther greenish-white, locally abundant. 11 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov*, **CBL 1260** (AAU, HN!, LE!, MO). **N.Vietnam, Bac Thai** prov., **Ngan Son** distr., Ngan Son mun., near Gio Pass, 22°25'N 105°58'E, 879 m, occasional on roadcut among short grasses. Outer free tepals bright yellow inside, spotted with minute red-purple spots, labellum green-yellow with bright red spots on platform, ridged, rostellum similar yellow-green, lighter at tip, flower fading to deep red-orange past anthesis. 8 IV 1998, *D.K.Harder, P.K.Loc, N.Q.Binh*, **DH 4364** (HN!, LE!, MO).

8. *Bulbophyllum* Thouars

8.10. *B. ambrosia* (Hance) Schlechter

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphytic and lithophytic creeping vine 1–2 m lg, common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov*, **NTH 3663** (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophyte and epiphyte, very common on tops of ridge. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam*, **CBL 737** (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, very common, sporadically abundant. 2 XII 1998, *L.Averyanov, P.K. Loc*, **CBL 805** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on open mossy rocks, abundant. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb*, **NTH 3510** (HN!, K, LE!).

8.11. *B. andersonii* (Hook. f.) J.J. Smith

N.Vietnam, Son La prov., **Moc Chau** distr., Chieng Hac mun., vicin. of Co Liu village, 20°51'N 104°38'E, 1200–1240 m, primary evergreen broad-leaved wet mossy forest along rocky tops of remnant karst limestone ridge. Lithophytic and epiphytic creeping vine 0.5–1 m lg, flowers dull yellowish pink-violet spotted, abundant. 29 V

1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2973* (HN!, LE!).

8.12. *B. hirtum* (J.E. Smith) Lindl.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, about 21 km from Cao Bang town to the N, 850–900 m, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, not common. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1042* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on high mossy trees, not common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3606* (HN!, K, LE!).

8.13. *B. hymenanthum* Hook.f.

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Creeping lithophyte, flowers, tepals pale yellowish, lip, column foot and column purple-violet, lip sides yellowish, anther yellow, rare. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1304c* (HN!, LE!).

8.14. **B. macraei* (Lindl.) Rchb. f.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 550–600 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of karst remnant limestone ridge. Lithophytic creeping herb on vertical shady cliffs of N exposition, flowers pinkish, very common. 24 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1699* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic creeping vine on open mossy rocks and cliffs, abundant. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3531* (HN!, K, LE!); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200 m, secondary mossy shrubs and grasslands on open slopes. Creeping lithophytic vine on mossy open limestone rocks, flowers dirty yellow with reddish marks, not smelled, abundant. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3278* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphytic and lithophytic creeping vine up to 1 m lg, common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3602* (HN!, K, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 450–550 m, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Epiphyte and occasional lithophyte, common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3815* (HN!, LE!).

8.15. **B. modestum* Hook. f.

N.Vietnam, Ha Giang prov., Yen Minh distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1400 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on high mossy trees, not common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3462* (HN!, K, LE!).

8.16. **B. parviflorum* Par. et Rchb. f.

N.Vietnam, Bac Can prov., Na Ri distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 650–700 m, primary evergreen mixed mossy forest with *Pseudotsuga brevifolia* and bamboo along tops of karst remnant limestone ridge. Epiphyte on high trees, flowers sweet-honey smelled, tepals white, light yellowish at the base, lip white, light greenish, not common. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3728* (HN!, K, LE!).

8.17. *B. purpureifolium* Aver.

N.Vietnam, Bac Can prov., Na Ri distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophytic and epiphytic vine up to 3 m lg, leaves below deep violet, not rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3677* (HN!, K, LE!). **N.Vietnam, Cao Bang prov., Ha Lang distr., Thang Loi mun.,** vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600 m, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Lithophyte on open rock outcrops, not rare. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 690* (AAU, HN!, LE!, MO); id., **Ha Lang distr., Thanh Nhat mun.,** 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophyte and epiphyte, very common on tops of ridge. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 739* (AAU, HN!, LE!, MO); id., **Nguyen Binh distr., Ca Thanh mun.,** vicin. Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, about 38 km to NWW from Cao Bang town, 1350–1450 m, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Epiphyte, very common. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 546* (AAU, HN!, LE!, MO); id., **Thach An distr., Duc Xuan mun.,** 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte, common, sporadically abundant. 2 XII 1998, *L.Averyanov, P.K. Loc, CBL 801* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Dong Van distr., Tu Tinh mun.,** 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on open mossy rocks, leaves below deep violet, common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3511* (HN!, K, LE!); id., **Quan Ba distr., Can Ti mun.,** vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m,

primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic and epiphytic creeping vine up to 2 m lg, leaves below pink-violet, flowers orange-yellow with purple-brown marks, very common. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3577** (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophyte and epiphyte in open places, abundant. 1 V 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1993** (AAU, HN!, LE!, MO).

8.18. *B. reptans* (Lindl.) Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, flowers yellowish-green, very common. 18 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 408** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, abundant, especially on ridge tops. 28 VI 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1797** (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, abundant. 29 VI 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1871** (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Creeping epiphytic vine 20–40 cm long, flowers yellow, very common. 5 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3317** (HN!, K, LE!); id., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 48.2 km to 36° of Ha Giang town, 1200–1250 m, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Lithophyte and epiphyte, flowers yellowish-green, very common. 7 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3441** (HN!, K, LE!). **N.Vietnam, Lao Cai** prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1600–1700 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphyte on high trees, common. 21–22 V 1999, *N.T.Hiep*, *P.H.Hoang*, *L.Averyanov*, **NTH 2852, 2853a** (HN!, LE!).

8.19. *B. retusiusculum* Rchb. f.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to

SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, very common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 402* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600–650 m. Primary open coniferous and mixed semideciduous forest with *Pinus kwantungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, leaves below violet, common. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 758* (AAU, HN!, LE!, MO).

8.20. **B. schweliense* W.W. Smith

N.Vietnam, Lao Cai prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), 1800–1900 m, primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphyte on high trees, flowers pale yellow, common. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2854* (HN!, LE!).

8.21. *B. stenobulbon* Par. et Rchb. f.

N.Vietnam, Ha Giang prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, flowers yellow with yellow-orange tips of tepals, abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1872* (AAU, HN!, LE!, MO).

8.22. **B. striatitepalum* Seidenf.

N.Vietnam, Ha Giang prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, leaves below violet, not common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1806* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1500–1550 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, flowers odourless, tepals yellow-green, with purple stripes, lip yellowish-green with purple stripes, column yellowish, anther cap yellow, leaves below violet, locally common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3496* (HN!, K, LE!).

8.23. *B. xylophyllum* Par. et Rchb. f.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 500–600 m, primary broad-leaved evergreen dry closed forest on very steep slopes of remnant karst limestone ridge. Epiphyte on high trees, flowers yellowish, tepals with brown stripes, rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3699* (HN!, K, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 450–550 m, primary broad-leaved

evergreen dry forest along tops of karst remnant limestone ridge. Epiphyte, not rare. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3812* (HN!, K, LE!).

9. *Calanthe* R. Br.

9.24. *C. alismifolia* Lindl.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, Bong village. Terrestrial herb to 30 cm, stem pale green, leaves deep green upper, flowers white. 10 VIII 1999, *N.M.Cuong, M.V.Sinh, H.L.Quyen, NMC 422* (HN!).

9.25. *C. alleizetti* Gagnep.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Nam Linh mt., 22°47'N 105°49'E, 1550–1600 m, old secondary broad-leaved wet mossy cloud forest along tops of remnant karst limestone Nam Linh ridge. Terrestrial herb up to 0.4 m hg in shady deep karst crevices and depressions, tepals white with pink-violet tint, common. 15 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1402* (AAU, HN!, LE!, MO).

9.26. *C. argenteo-striata* Tang et Cheng

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 500–600 m, primary broad-leaved evergreen dry closed forest on very steep slopes of remnant karst limestone ridge. Terrestrial and lithophytic herb in shady places, leaves with silver stripes, not rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3697* (HN!, K, LE!).

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 400 m, secondary evergreen forest on alluvial valley among limestone rocks on foothills of remnant limestone ridges. Terrestrial and lithophytic herb on steep shady slopes, leaves deep green with silver-white stripes, very common. 24 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 611* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Terrestrial and lithophytic herb in shady steep slopes, leaves pale green with silver stripes, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 716* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 550–600 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of karst remnant limestone ridge. Lithophytic herb, flowers white, lip with yellow center, tepals to the tips greenish, later flowers yellow, leaves green with white-silver stripes, common. 24 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1670* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1400 m, primary evergreen broad-leaved forest on steep slopes and bluffs of remnant karst limestone ridge. Terrestrial herb in shady wet places, leaves deep green with longitudinal silver-whitish stripes, flowers, tepals light green, lip yellowish-white with yellow center, later yellow, column and anther white, not rare. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1315* (AAU, HN!, LE!, MO); id., **Thach An** distr., Van Trinh mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 600 m, secondary open semideciduous broad-leaved forest on steep slopes near tops of remnant limestone ridge. Lithophytic

and terrestrial herb on steep shady slopes, leaves with silver-white stripes, very common. 3 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 835* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 25 km to SSE from Cao Bang town, 22°27'N 106°22'E, 500 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Terrestrial herb on steep shady slopes, flowers white, lip with yellow center, leaves deep green with silver stripes, very common. 5 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 918* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen (Lakes distr.), 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Widespread herb among rocks, leaves plicated and shiny green above, sometimes with white mottling above, inflorescence to 1 m, bracts green, petals all white, fading to yellow to orange. 7 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4317* (HN!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophytic herb on wet shady rocks, flowers white, lip with yellow center, not rare. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1760* (AAU, HN!, LE!, MO); id., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Terrestrial and lithophytic herb in shady places and rock crevices, leaves with silver-white longitudinal stripes, common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3523* (HN!, K, LE!). **N.Vietnam, Lang Son** prov., Huu Lien mun., Huu Lien protected area, roadside on hills and around margin of swamp, 21°40'N 106°22'E, 100 m. Occasional among rocks and in pockets of soil, leaves deep green, bracts on inflorescence light green at base, deep green at tip, all corolla parts white with yellow throat, becoming yellow-orange. 1 IV 1998, *D.K.Harder, P.K.Loc, DKH 4097* (HN!, MO). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 100–200 m, primary closed evergreen broad-leaved forest on steep rocky slopes and cliffs of remnant karst limestone ridge. Lithophytic herb on shady rocks, leaves deep green with silver-white stripes, not rare. 22 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3769* (HN!, K, LE!).

9.27. *C. clavata* Lindl.

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system, 23°56'N 105°13'E, 1100–1200 m, primary evergreen broad-leaved very wet mountain forest on shale very steep slopes. Terrestrial herb in shady rocky shale slope, very common. 3 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2094* (AAU, HN!, LE!, MO).

9.28. *C. herbacea* Lindl.

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system, 1100–1200 m, 1100–1200 m, primary evergreen broad-leaved very wet mountain forest on shale very steep slopes. Terrestrial herb in shady rocky shale slope, very common. 3 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2093*

(AAU, HN!, LE!, MO). **N.Vietnam, Lao Cai** prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), 1600–2100 m, primary wet evergreen broad-leaved forest on very steep rocky slope. Terrestrial and lithophytic herb on wet shady very steep slopes, common. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2813* (HN!, LE!).

9.29. **C. mannii* Hook. f. (= *C. brachychila* Gagnep.).

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Man Lung ridge, 22°47'N 105°49'E, 1400–1450 m, secondary mossy short tall grasslands on alluvial foothills of remnant karst limestone Man Lung ridge. Terrestrial herb in open place, flowers odorless, tepals light brownish with yellowish base, lip yellow, column and anther white, not common. 18 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1544* (AAU, HN!, LE!, MO).

10. *Callostylis* Blume

10.30. *C. rigida* Blume

N.Vietnam, Cao Bang prov., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic vine up to 2–3 m lg on open rocks, flowers dull yellowish-orange, lip with violet marks, common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 903* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°48'N 106°17'E, about 16 km from Cao Bang town to the N, 600 m, remnants of primary evergreen broad-leaved forest on alluvial valley between remnant limestone ridges, creeping epiphytic vine 2–3 m lg on high tree, not common. 11 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1086* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., from Ngam Thiep to Rao An village, 18° 21' 47"N 105° 14' 10"E, 200 m, secondary forest. Epiphyte along stream, sepals and petals brown-yellow, stamens deep violet, very common. 27 IV 1998, *N.T.Hiep, V.V.Can, VA 366* (HN!, LE!, MO); id., **Huong Son** distr., Son Kim mun., Huong Son forest enterprise along Rao Anh river, 18° 25'N 105° 13'E, 200–220 m, primary forest. Epiphyte on tree branches along stream, vining, common, bracts dull yellow, tepals dull orange, upper petal dull brown, labellum yellow, black at base. 13 VI 1999, *D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, HS-274/4415* (HN!, LE!, MO).

11. *Cephalantheropsis* Guillaum.

11.31. *C. gracilis* (Lindl.) Hu

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, about 38 km to NW from Cao Bang town, 1350–1450 m, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Terrestrial herb up to 1 m hg in shady canyons, tepals yellowish-green, lip yellowish-white with yellow spot near epichile base, common.

21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 545* (AAU, HN!, LE!, MO).

12. *Ceratostylis* Blume

12.32. *C. himalaica* Hook.f.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, primary evergreen mixed mossy forest with *Pseudotsuga brevifolia* and bamboo along tops of karst remnant limestone ridge. Epiphyte on high mossy trees, very common. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3724* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Tra Linh** distr., Quang Vinh mun., 22°48'N 106°17'E, about 16 km from Cao Bang town to the N, 600 m, remnants of primary evergreen broad-leaved forest on alluvial valley between remnant limestone ridges. Epiphyte on high trees, sporadically abundant. 11 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1088* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Epiphyte on mossy trees, not common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3528* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on high mossy trees, very common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3610* (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Rao An – Ngam Thep village, 18°21'N, 105°14'E to 18°20'N, 105°14'E, 900–1150 m, broad-leaved evergreen forest with *Fokienia hodginsii* and *Dacrycarpus imbricatus*. Epiphyte. 22 IV 1998, *N.T.Hiep, N.K.Dao, P.K.Loc, V.V.Can, VA 290* (HN!, MO).

12.33. *C. siamensis* Rolfe ex Downie

N.Vietnam, Lao Cai prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), 1500–1600 m, primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphyte on mossy trees in shady place, locally abundant. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2805* (HN!, LE!).

12.34. *C. subulata* Blume

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Ngam Thep region, 18°21'N, 105°14'E to 18°21'N, 105°15'E, 870 m, primary mixed evergreen forest. Epiphyte, common. 7 V 1998, *N.T.Hiep, N.Q.Binh, L.Xiem, VA 460* (HN!, MO).

13. *Cheirostylis* Blume

13.35. *Ch. bipunctata* Aver.

N.Vietnam, Ha Giang prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte

in rock crevices, leaves pale dull green, not common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3526* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 400–600 m, secondary shrubs among limestone mossy rocks on very steep slope of karst remnant limestone ridge. Lithophytic herb in crevices of mossy limestone cliffs, leaves dull pale green, common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3631* (HN!, K, LE!).

13.36. *Ch. eglandulata* Aver.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1050–1100 m, secondary open broad-leaved forest on alluvial foothills of remnant karst limestone ridges. Lithophyte on open mossy limestone rocks, flowers white. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1372* (LE!). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophytic herb on wet shady rocks, not common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1760b* (LE!).

13.37. *Ch. marmorifolia* Aver. (= *Ch. marmorata* Aver., 1999, Lindleyana 14, 4 : 216, non Lindl. ex Lem., 1848)

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Lithophytic creeping herb, leaves grey-greenish with green nerves, rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1485* (HN!, LE!); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridges. Lithophyte on shady rocks, leaves silvery-white with dark green veins, rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL sine no* (LE!); id., **Tra Linh** distr., Quoc Toan mun., vicinity of Thang Heng and Lung Tao villages near Thang Heng lake, 500–650 m, remnant closed evergreen primary broad-leaved forest on steep slopes and bluffs of limestone ridges and mesas near karst lake. Lithophyte on shady rocks, rare. 27 V 1997, *L.Averyanov, N.T.Hiep, VH sine no* (LE!).

14. *Chiloschista* Lindl.

14.38. **Ch. trudelii* Seidenf.

N.Vietnam, Son La prov., **Moc Chau** distr., Chieng Hac mun., vicin. of Co Liu village, 20°51'N 104°38'E, 700–800 m, primary evergreen broad-leaved wet forest on very steep slopes and bluffs of remnant karst limestone ridge. Epiphyte on high trees, flowers dull yellow, lip side lobes with reddish veins, rare. 29 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2943* (HN!).

15. *Cleisostoma* Blume

15.39. *C. birmanicum* (Schlechter) Garay

N.Vietnam, Ha Giang prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on mossy trees, not common. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3611** (HN!, K, LE!).

15.40. *C. fuersteinbergianum* Kraenzl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600–650 m, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, rare. 28 XI 1998, *L.Averyanov*, *P.K.Loc*, **CBL 754** (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, not common. 2 XII 1998, *L.Averyanov*, *P.K.Loc*, **CBL 803** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Epiphyte on mossy trees, common. 10 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3516** (HN!, K, LE!).

15.41. *C. paniculatum* (Ker.-Gawl.) Garay

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, about 21 km from Cao Bang town to the N, 800–850 m, open secondary broad-leaved forest with bamboo along tops of remnant limestone ridge. Epiphyte, rare. 9 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 1012** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, about 21 km from Cao Bang town to the N, 850–900 m, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphytic and lithophytic shrub with pendant shoots up to 0.5 m lg, common. 10 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 1053** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic shrub up to 1 m hg on open mossy rocks, very common. 10 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3518** (HN!, K, LE!); id., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 48.2 km to 36° of Ha Giang town, 1200–1250 m, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Lithophytic shrublet up to 0.5 m hg on open mossy cliffs, rare. 7 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3437** (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops

of karst remnant limestone ridge. Lithophyte on mossy rocks and epiphyte, common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3585* (HN!, K, LE!).

15.42. *C. rostratum* (Lindl.) Garay

N.Vietnam, Cao Bang prov., Ha Lang distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600–650 m, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, common. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 751* (AAU, HN!, LE!, MO); id., **Ha Lang distr.**, Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 350–400 m, secondary evergreen broad-leaved closed forest on steep bluffs of remnant limestone ridges. Lithophytic herb on vertical shady cliffs of NW exposition, leaves below purple-violet, rare. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 695* (AAU, HN!, LE!, MO); id., **Thach An distr.**, about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–400 m, primary evergreen broad-leaved closed wet forest along deep shady canyon of remnant limestone ridge. Lithophytic herb with pendant shoots up to 0.6 m lg on steep shady waterfall cliffs, common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 951* (AAU, HN!, LE!, MO).

N.Vietnam, Ha Giang prov., Dong Van distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on shady cliff, leaves violet, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3508* (HN!, K, LE!). **N.Vietnam, Lang Son prov., Huu Lung distr.**, Huu Lien mun., 21°40'N 106°22'E, 270 m, primary dry evergreen broad-leaved forest along tops of remnant karst limestone ridge. Lithophyte on shady cliffs, not rare. 2 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3272* (HN!, K, LE!). **N.Vietnam, Thai Nguyen prov., Vo Nhai distr.**, Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 100–200 m, primary closed evergreen broad-leaved forest on steep rocky slopes and cliffs of remnant karst limestone ridge. Lithophyte on shady rocks, common. 22 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3767* (HN!, K, LE!).

15.43. *C. striatum* (Rehb. f.) Garay

N.Vietnam, Bac Can prov., Na Ri distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 600–700 m, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Epiphyte on mossy trees on shady cliff, common. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3717* (HN!, K, LE!). **N.Vietnam, Cao Bang prov., Tra Linh distr.**, Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, about 22 km from Cao Bang town to the N, 900–1000 m, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte in shady places, not rare. 12 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1145* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Quan Ba distr.**, Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus*,

Taxus, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on mossy trees, not rare. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3593** (HN!, K, LE!). **N.Vietnam**, **Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Epiphyte, fruits with violet line. 17 IX 1999, *N.T.Hiep*, *N.X.Tam*, *N.M.Cuong*, *M.V.Sinh*, **NTH 3074** (HN!).

15.44. *C. williamsonii* (Rchb. f.) Garay

N.Vietnam, **Bac Can** prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 550–600 m, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Epiphyte on high trees, not common. 20 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3714** (HN!, K, LE!). **N.Vietnam**, **Cao Bang** prov., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 700 m, secondary semideciduous broad-leaved open forest along tops of remnant limestone ridge. Epiphyte, not common. 26 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 680** (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, not common. 4 XII 1998, *L.Averyanov*, *N.Q.Binh*, *P.K.Loc*, *N.X.Tam*, **CBL 898** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, about 22 km from Cao Bang town to the N, 900–1000 m, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte in shady places, not rare. 12 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *P.K.Loc*, *N.X.Tam*, **CBL 1143** (AAU, HN!, LE!, MO). **N.Vietnam**, **Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte and epiphyte with pendant shoots up to 0.5 m lg, common. 10 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3525** (HN!, K, LE!). **N.Vietnam**, **Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 450–550 m, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Epiphyte, common. 23 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3811** (HN!, K, LE!).

16. *Coelogyne* Lindl.

16.45. *C. fimbriata* Lindl.

N.Vietnam, **Cao Bang** prov., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 700 m, secondary semideciduous broad-leaved open forest along tops of remnant limestone ridge. Lithophyte and epiphyte, not common. 26 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 683** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte and lithophyte, flowers pale yellow, lip with brown keels, very common, sporadically

abundant. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 743* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte and epiphyte, flowers pale yellow, lip with deep brown keels and brown venation, very common, sporadically abundant. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 815* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophyte and epiphyte, flowers yellowish, lip with brown spots, abundant. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3312* (HN!, K, LE!); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1862* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on open mossy rocks, flowers dull yellow, lip with brown stripes and 2 brown spots on epichile, abundant. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3517* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophyte and epiphyte, flowers dull yellow, lip with brown stripes and two brown spots on epichile, abundant. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3583* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, May Bac peak, 500 m, limestone forest. Lithophytic herb, petals green-yellow. 18 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3105* (HN!).

16.46. *C. lockii* Aver.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, very common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 407* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Epiphyte, flowers white, epichile with yellow central spot, very common, occasionally abundant. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1299* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Creeping lithophytic

and epiphytic vine up to 1 m lg, very common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3587* (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1400–1500 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on high mossy trees, not rare. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3463* (HN!, K, LE!).

16.47. **C. malipoensis* Tsi

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Lithophyte and epiphyte, very common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 395* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophytic herb on vertical cliffs, flowers pale yellowish-pink, nearly white, lip white, epichile pale yellow with deep orange spot, anther orange-pink, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 315* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 48.2 km to 36° of Ha Giang town, 1200–1250 m, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Lithophytic herb on mossy shady cliffs, tepals and lip whitish with pink tint, column white, common. 7 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3436* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic herb on mossy rocks, very common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3575* (HN!, K, LE!).

16.48. **C. schultesii* Jain et Das

N.Vietnam, Ha Giang prov., **Bac Quang** (Quan Ba) distr., near Quyet Tien village at 900–1000 m, primary dry shady evergreen forest near top of remnant limestone mountain. Epiphyte and lithophyte on open rocks, abundant. 27 X 1995, *L.Averyanov, N.T.Hiep, D.D.Huyen, HG 87* (HN, LE!); id., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system, 23°56'N 105°13'E, 1200–1300 m, primary evergreen broad-leaved very wet mountain forest on shale very steep slopes. Epiphyte on high trees, flowers odorless, tepals white, with light green-yellowish tint, lip white, with yellow epichile center and light brown side lobes, column inside light brown, dorsally white, anther light yellowish, common. 3 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2092* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophytic creeping herb in mossy open rock outcrops, flowers odorless, tepals white

with very light yellowish-pink tint, lip white with side lobes brown, center of epichile brownish-yellow, column yellowish-white with brownish base, anther white, not rare. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1939* (AAU, HN!, LE!, MO). **S.Vietnam, Kon Tum** prov., **Dak Gley** distr., about 10–12 km to the SE of Dak Gley town (4–6 km to the E of Dak Tung village), 1100–1200 m, primary evergreen mountain mixed with *Pinus khesya* forest. Epiphyte, not rare. 6 XII 1995, *L.Averyanov, N.T.Hiep, P.K.Loc et al., VH 2365* (AAU, HN!, LE!, MO, P).

17. *Collabium* Blume

17.49. *C. chinense* (Rolfe) Tang et Wang

N.Vietnam, Vinh Phuc prov., **Tam Dao** distr., vicin. of Tam Dao town, 21°27'N 105°39'E, 950 m, secondary evergreen broad-leaved wet forest on very steep SW riolite slopes of Tam Dao ridge, along waterfall cascade. Terrestrial prostrate herb on steep shady slopes, leaves with dirty violet spots, common. 6 VI 1999, *P.K.Loc, L.Averyanov, TD 19* (HN!, LE!).

18. *Corymborkis* Thouars

18.50. *C. veratrifolia* (Reinw.) Blume

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Dan village, Cuc Phuong national park, forest dominated by *Streblus macrophyllus*. Herb to 1 m tall, peduncles and floral bracts green, flower white. 19 VI 1999, *M.A. Jaramillo, R. Callejas, N.T.Hiep, N.M. Cuong, MAJ 494* (HN!).

19. *Cryptochilus* Wall.

19.51. **C. lutea* Lindl.

N.Vietnam, Ha Giang prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte on mossy rocks and tree stems, abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1806b* (LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1400–1500 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, flowers yellow, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3479* (HN!, K, LE!).

20. *Cymbidium* Sw.

20.52. *C. aloifolium* (L.) Sw.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 400 m, secondary evergreen forest on alluvial valley among limestone rocks on foothills of remnant limestone ridges. Lithophyte and epiphyte, very common. 24 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 610* (AAU, HN!, LE!, MO); id., **Nguyen**

Binh distr., Thai Hoc mun., about 5–6 km to ENE of Nguyen Binh town, 22°39'N 105°57'E, 500–550 m, secondary open shrubs on steep slopes of karst remnant limestone mesa. Lithophytic herb on vertical limestone cliffs, tepals yellowish with purple central stripe, lip purple brownish, with yellow longitudinal stripes and yellow keels, column deep purple, anther yellow, very common. 21 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1591* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 25 km to SSE from Cao Bang town, 22°27'N 106°22'E, 500 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Lithophyte on open rocks, very common. 5 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 922* (AAU, HN!, LE!, MO). id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Lithophyte on open vertical cliffs, very common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 958* (AAU, HN!, LE!, MO). **N.Vietnam, Quang Ninh** prov., **Hon Gai** distr., Halong bay, Dan Go island, 0–100 m, secondary broad-leaved evergreen forest on steep limestone slopes and vertical bluffs. Lithophytic herb on vertical cliffs, sepals purple-brownish with yellow margin, lip of typical coloration, very common. 12 V 1999, *N.T.Hiep, L.Averyanov, NTH 2626* (HN!, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 300 m, primary dry broad-leaved evergreen forest on very steep rocky slopes of remnant karst limestone ridge. Lithophytic herb on open mossy rocks on tops of ridge, common. 24 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3875* (HN!, K, LE!).

20.53. *C. cyperifolium* Wall. ex Lindl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Terrestrial herb in shady place, rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 740* (HN!, LE!).

20.54. *C. ensifolium* (L.) Sw.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 600–700 m, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Terrestrial herb among shady rocks, not rare. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3718* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Terrestrial herb on steep shady slopes, flower tepals olive-green with brown stripes, lip dull yellowish-green with dirty-purple spots, very common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 399* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial and lithophytic herb, common. 15 XI 1998,

L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 322 (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial herb on rocky shady steep slope, common. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1987* (AAU, HN!, LE!, MO).

20.55. *C. erythraeum Lindl.

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1500–1550 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Lithophytic herb on open mossy rocks, inflorescence erect up to 1.2 m hg, flowers odorless, tepals olive-green with brown-purple marks and stripes, lip dull yellow, with purple-brownish stripes, keels white, with purple marks, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3501* (HN!, LE!).

20.56. C. floribundum Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Nam Linh mt., 22°47'N 105°49'E, 1550–1600 m, old secondary broad-leaved wet mossy cloud forest along tops of remnant karst limestone Nam Linh ridge. Epiphyte and lithophyte, flowers odorless, tepals brownish with yellowish sides, lip white with purple marks on lip sides, large deep-purple spot on epichile apex and yellow keels, column light yellowish-brown, with purple base, anther yellow, common. 15 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1407* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1000 m, secondary wet broad-leaved evergreen forest in deep shady limestone ridge canyon along stream. Lithophytic herb on open limestone mossy rocks, not common. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1457* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Epiphyte, flowers light sweet smelled, tepals brownish-purple with yellowish margin, lip white with numerous purple marks and yellow keels, column dirty purple-greenish, common. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1480* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1400 m, primary evergreen broad-leaved forest on steep slopes and bluffs of remnant karst limestone ridge. Epiphyte, tepals olive-brown with yellowish margin, lip light pinkish with yellow keels and numerous small purple marks, column olive-brownish, anther yellow, not common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1313* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Nguyen Binh mun., 22°37'N 105°52'E, about 41 km to W from Cao Bang town, elevation from Le A pass to Na Ni mt. peak at 1400–1900 m, old secondary closed evergreen wet mountain forest on soils developed on granite and shale rocks. Terrestrial and lithophytic herb, not common. 11–12 XI 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 212* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr.,

Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, common. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1986* (AAU, HN!, LE!, MO).

20.57. *C. lancifolium* Hook.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 600–700 m, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Terrestrial herb among shady rocks, not rare. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3719* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic and terrestrial herb on steep slopes, not rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 634* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Terrestrial and lithophytic herb in shady places, leaves silver-green, very common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 734* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1250–1300 m, primary semideciduous broad-leaved forest on steep slopes and bluffs of remnant karst limestone ridge. Terrestrial and lithophytic herb, tepals white with pink tint and central pink stripe, lip white with purple-pinkish marks, very common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1276* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Terrestrial and lithophytic herb on open rocks, common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 886* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lake, 22° 45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Rare. 7 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4328* (HN!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic herb on steep mossy cliffs, tepals white, with purple stripes, lip purple with white marks, common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1749* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophyte, sepals white, pinkish, petals white-pinkish, with central purple stripe, lip white-pinkish, with purple marks, very common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1870* (AAU,

HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic herb on steep mossy slopes, tepals white, lateral petals with central purple stripe, lip white with numerous purple marks along margin, tip white, column white with fine longitudinal purple stripes, anther yellowish, very common. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1942* (AAU, HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Bong village, primary forest. Terrestrial herb, weed place. 14 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3020* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 450–550 m, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Terrestrial herb in shady place, flowers odorless, tepals light green, lip whitish with purple-brownish marks, not rare. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3805* (HN!, K, LE!).

20.58. *C. lowianum (Rchb. f.) Rchb. f.

N.Vietnam, Lao Cai prov., **Sa Pa** town, flowers were collected in private nursery in Sa Pa town from plants collected in the wild in Sa Pa area at about 1500–2000 m, 22°20'N 103°50'E. Flowers odorless, tepals dull light yellow-green-brownish, lip yellowish-white, with V-form purple-brown spot on epichile, keels white, column and anther dull yellowish, column inside with purple-brown numerous marks. 18 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH sine no* (LE!).

20.59. C. sinense (Jacks.) Willd.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, Bong village. Terrestrial herb 30 cm, very common, fruit pale green. 17 IX 1999, *N.M.Cuong, M.V.Sinh, H.L.Quyen, NMC 525* (HN!).

20.60. C. suavissimum Sander ex C.Curtis

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte on open rocks, common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 400, 401* (AAU, HN!, LE!, MO).

21. Dendrobium Sw.

21.61. D. acinaciforme Roxb.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, very common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3678* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about

50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphyte, not rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 628* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, very common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 735* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 809* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, very common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 893* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°48'N 106°17'E, about 16 km from Cao Bang town to the N, 600 m, remnants of primary evergreen broad-leaved forest on alluvial valley between remnant limestone ridges. Epiphyte on high trees, common. 11 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1080* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Epiphyte on mossy trees, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3534* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2.5 km SW from Bong center, limestone primary forest. Epiphyte on Diospyros tree, fruits green. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3052* (HN!); id., **Nho Quan** distr., Cuc Phuong national park, May Bac peak, 500 m, limestone forest. Lithophytic herb, flowers white-violet. 18 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3104* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 450–550 m, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Epiphyte on mossy trees, common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3809* (HN!, K, LE!).

21.62. *D. aphyllum* (Roxb.) Fischer

N.Vietnam, Lao Cai prov., **Than Uyen** distr., Ho Mit mun., Ho Mit village, 22°6'N 103°52'E, 700 m, epiphyte along Mit Noi river in vicin. of Ho Mit village. Flowers odorless, tepals white, lip white, with purple center and purple-violet base, column white, anther light purple-violet. 20 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2663* (LE!).

21.63. *D. cariniferum* Rchb. f.

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1400 m, primary evergreen broad-leaved forest on steep slopes and bluffs of remnant karst limestone ridge. Epiphyte in open places, tepals yellowish-white, lip yellowish-white, base of epichile orange-pink with white hairs, tips of lip sides pink-

orange, rare. 13 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1311** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte, tepals light yellowish-white, lip yellowish white with reddish-orange center, column white, anther yellow. 29 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1852** (AAU, HN!, LE!, MO).

21.64. *D. chrysanthum* Lindl.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 600–700 m, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Lithophytic herb with pendant shoots on shady cliffs, flowers sweet smelled, tepals bright yellow, lip with central chestnut spot on epichile, common. 20 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3723** (HN!, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600–650 m, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophyte on open rocks, rare. 28 XI 1998, *L.Averyanov*, *P.K.Loc*, **CBL 756** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte and epiphyte with shoots up to 1.2 m long, flowers sweet smelled, tepals bright yellow, lip with two chestnut-purple spot, not rare. 10 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3537** (HN!, K, LE!).

21.65. *D. faulhaberianum* Schlechter

N.Vietnam, Ha Tinh prov., **Huong Son** distr., from Rao An town to Vietnam-Laos border along Road number 8, 18° 26'N 105° 13'E, 800 m. Epiphyte on *Ficus*, petals violet. 21 V 1998, *N.T.Hiep*, *P.K.Loc*, *N.Q.Binh*, *T.T.Phuong*, *L.Xiem*, **VA 784** (HN!, MO).

21.66. *D. fimbriatum* Hook.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, very common. 18 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 405** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic herb up to 1 m hg on tops of ridge, common. 25 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 629** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 550–600 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of

karst remnant limestone ridge. Lithophyte and epiphyte, flowers yellow, common. 24 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1693* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic herb up to 1.2 m hg on open rocks, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 714* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte on open rocks, common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 800* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Terrestrial and lithophytic herb with shoots up to 2 m lg on open rocks, very common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 885* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, not rare. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1984* (AAU, HN!, LE!, MO). **N.Vietnam, Lai Chau** prov., **Sin Ho** distr., Ta Ngau mun., about 30 km of Lai Chau town to the N, 22°18'N 103°15'E, 1600 m, secondary open wet mossy evergreen broad-leaved forest with remnants of primary elements on rocky foothills of remnant karst limestone ridge. Lithophytic herb on open wet mossy vertical limestone cliff, flowers brightly yellow, lip with chestnut spots on side lobes, common. 25 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2763* (HN!, LE!).

21.67. *D. hercoglossum* Rchb. f.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Ngam Thiep, 18° 22'N 105°13'E, 197–240 m. Epiphyte, petals light pink or white. 23 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 844* (HN!, MO); id., **Huong Son** distr., Son Kim mun., Huong Son forest enterprise along Rao Anh river, 18° 25'N 105° 13'E, 200–220 m, primary forest. Common on trees over stream, tepals light pink, labellum white inflated, rostellum tip deep purple. 13 VI 1999, *D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, 4430/HS-289* (HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2,5 km SW from Bong village, 350 m, limestone weed forest. Epiphytic herb on *Diospyros* tree. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3051* (HN!).

21.68. *D. lindleyi* Steud.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3673* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about

50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphyte, rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 638* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600–650 m, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, not rare. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 753* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 808* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, not common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 892* (AAU, HN!, LE!, MO).

21.69. *D. loddigesii* Rolfe

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 650–700 m, secondary open semideciduous broad-leaved forest along tops of remnant karst limestone ridge. Epiphytic and lithophytic creeping herb, tepals pink-violet, lip yellow with pink-violet apex margin and whitish base, not rare. 24 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1685* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., about 39 km to SSE from Cao Bang town, 22°21'N 106°27'E, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, not common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 798* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 450–500 m, primary evergreen broad-leaved closed dry forest on steep slopes and bluffs near tops of remnant limestone ridge. Epiphyte in shady places, rare. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 880* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, about 21 km from Cao Bang town to the N, 850–900 m, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Small lithophytic creeping vine in shady places, not rare. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1043* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Creeping lithophyte on shady vertical cliffs, not common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 959* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphytic and lithophytic creeping herb on shady places, not common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1854* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai

village, 6 km to W of Yen Minh town, 23°7'E 105°8'N, 1500-1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, not rare. 1 V 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1992** (AAU, HN!, LE!, MO). **N.Vietnam, Lang Son** prov., **Huu Lung** distr., Huu Lien mun., 21°40'N 106°22'E, 400–450 m, primary evergreen broad-leaved wet forest on steep slopes of remnant karst limestone ridge. Epiphyte and occasionally lithophyte, not rare. 1 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3262** (HN!, K, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 100–200 m, primary closed evergreen broad-leaved forest on steep rocky slopes and cliffs of remnant karst limestone ridge. Lithophyte on shady rocks, very common. 22 X 1999, N.T.Hiep, P.K.Loc, L.Averyanov, **NTH 3766** (HN!, K, LE!).

21.70. *D. lomatochilum* Seidenf.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Lithophytic herb. 17 IX 1999, N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, **NTH 3076** (HN!).

21.71. *D. longicornu* Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, very common. 18 XI 1998, L.Averyanov, P.K.Loc, N.X.Tam, **CBL 404** (AAU, HN!, LE!, MO); id., Bao Lac distr., Dinh Phung mun., Man Lung ridge, 22°47'N 105°49'E, 1550-1600 m, primary very wet cloud evergreen closed mixed forest with *Podocarpus* and *Fokienia* along tops of remnant karst limestone Man Lung ridge. Epiphyte, not rare. 18 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1546** (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte and epiphyte, not common. 15 XI 1998, L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, **CBL 317** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte on mossy rocks and tree stems, common. 28 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1805** (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1300 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte, flowers odorless, tepals white, lip white, epichile orange, common. 9 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3460** (HN!, K, LE!); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of

Pseudotsuga brevifolia along tops of remnant limestone karst ridge. Epiphyte and lithophyte, flowers white, epichile orange-red, not common. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3309* (HN!, K, LE!).

21.72. *D. nobile* Lindl.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, very common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3672* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Epiphyte, tepals white with purple-violet tips, lip white with deep violet center, purple-violet apex and purple-violet base, column green, anther purple-violet, not rare. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1305* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, about 21 km from Cao Bang town to the N, 850–900 m, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, not rare. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1060* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophyte on mossy rocks and epiphyte, common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3584* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., Cuc Phuong national park, primary forest on limestone, 450 m. 21 III 1999, *N.T.Hiep, D.Sopejato, N.M.Cuong, DDS 10665* (HN!, LE!).

21.73. **D. porphyrochilum* Lindl

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination of *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Epiphyte, tepals light green with purple nerves, lip light green with purple stripes at the base and uniformly deep green epichile, column light green, anther white, rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1484* (LE!).

21.74. *D. salaccense* (Blume) Lindl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic herb up to 0.5 m hg on steep cliffs, rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 715* (AAU, HN!, LE!, MO).

21.75. *D. terminale* Parish & Rchb. f.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Rao An – Ngam Thiep village, 18°23'N 105°13'E, 197–300 m, broad-leaved evergreen forest, in valley. Epiphyte on rock, flowers pink with violet stripe, fruit green. 13 IV 1992, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 8* (HN!, LE!, MO).

21.76. *D. thyrsiflorum* Rchb. f.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Ngam Thiep, 18°22'N 105°13'E, 197–240 m. Epiphyte, common along stream, petals white, labellum light yellow. 23 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 845* (HN!, MO).

21.77. *D. truncatum* Lindl.

N.Vietnam, Thai Nguyen prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 23.3 km to 18° of Thai Nguyen town, 300 m, primary dry broad-leaved evergreen forest on very steep rocky slopes of remnant karst limestone ridge. Epiphyte on high mossy trees, common. 24 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3834* (HN!, K, LE!).

22. *Epigeneium* Gagnep.**22.78. *E. amplum* (Lindl.) Summerhayes**

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'N, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Creeping epiphytic and lithophytic vine up to 2 m lg, abundant. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3674* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophytic and epiphytic vine up to 3 m lg, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 318* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphytic and lithophytic creeping vine 2–3 m lg, abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1798* (AAU, HN!, LE!, MO); id., **Dong Van** distr., Ho Quang Phin mun., 23°11'N 105°15'E, 48.2 km to 36° of Ha Giang town, 1250–1300 m, remnants of dry mossy open coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophytic and epiphytic vine 0.5–0.8 m long, flowers odorless, tepals ochraceous, lip white, epichile deep purple-brown, gypochile and column at front white with purple marks, anther cap white, abundant. 6 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3345* (HN!, K, LE!); id., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic creeping vine up to 0.5 m lg, tepals ochre-yellow, lip deep violet, nearly black, abundant. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3540* (HN!, K, LE!); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphytic and lithophytic creeping vine 1–2 m lg, very

common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1855* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophytic or epiphytic creeping vine up to 1 m lg, flowers odorless, tepals ochraceous, lip white, epichile deep purple-brown, gypochile and column at front white with purple marks, anther cap white. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3313* (HN!, K, LE!); id., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 48.2 km to 36° of Ha Giang town, 1200–1250 m, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Creeping lithophytic vine 0.5 m lg on open mossy rocks, tepals ochre-yellow, lip deep violet, nearly black, abundant. 7 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3435* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Creeping lithophytic and epiphytic vine up to 1 m lg, abundant. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3588* (HN!, K, LE!).

22.79. *E. chapaense* Gagnep.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Epiphyte, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 328* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Epiphyte, flowers chestnut-brown, lip with white-yellowish margin, not rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1483* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphyte, flowers chestnut with yellowish-white lip, common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 630* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, flowers yellowish-brown, very common, sporadically abundant. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 742* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung, vicin. of Na Lit village, 22°30'N 106°27'E, about 27 km to SE from Cao Bang town, 500–550 m, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte and lithophyte, flowers olive-brown, gypochile white, epichile olive-brownish-pink, column foot whitish, very common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 907* (AAU, HN!, LE!, MO). id., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, about 22

km from Cao Bang town to the N, 900–1000 m, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, very common. 12 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1138* (AAU, HN!, LE!, MO). id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, about 14 km from Cao Bang town to the N, 800 m, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, flowers olive-brown, abundant. 13 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1212* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 5°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1795* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1873* (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 26.2 km to 2° of Ha Giang town, 1100–1150 m, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on mossy trees, abundant. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3608* (HN!, K, LE!).

22.80. *E. labuanum* (Lindl.) Summerhayes

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 27 km to 55° of Bac Can town, 800 m, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphytic and lithophytic creeping vine 10–20 cm lg, common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3664* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, about 42 km to NWW from Cao Bang town, 1400–1450 m, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Creeping epiphyte and lithophyte, common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 393* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic creeping herb on shady steep cliffs, not rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 623* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, about 42 km to E from Cao Bang town, 600 m, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophyte and epiphyte, very common on tops of ridge. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 738* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca

Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Epiphyte and lithophyte, flowers deep dirty purple, lip dirty purple with yellow epichile having white margin, column white with purple base, anther dirty brownish-purple, very common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1304* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Epiphyte and lithophyte, tepals outside brownish-purple, inside yellowish with purple tint, lip brownish-purple with whitish base, whitish keels and yellow epichile, abundant. 19 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1579* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, about 39 km to SSE from Cao Bang town, 550 m, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte, very common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 807* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., vicin. of Trang Hen lake, 22°45'N 106°17'E, 666 m, disturbed forest on lower slope on upper slope of solid limestone rock, in light shade. New pseudobulb light green, subtended by brown bracts, petals all light yellow-green, fading to orange-red, labellum streaked in red inside, light yellow on tip, rostellum very light yellow. 6 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4279* (HN!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, tepals outside brownish-purple, inside yellowish with purple tint, lip brownish-purple with whitish base, whitish keels and yellow epichile, abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1804* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, flowers of typical coloration, abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1874* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophyte on shady mossy cliffs of N exposition, very common. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3310* (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Nga doi, 18°30'N 105°14'E, 500 m, primary and secondary forest on schist. Epiphyte. 19 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 752* (HN!, MO). **N.Vietnam, Lang Son** prov., **Huu Lung** distr., Huu Lien mun., 21°40'N 106°22'E, 400–450 m, primary evergreen broad-leaved forest with bamboo near the top of remnant karst limestone ridge. Lithophyte and occasional epiphyte on cliffs of N exposition, common. 1 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3251* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2,5 km

SW from Bong village to Vuon cave, primary limestone forest. Lithophytic herb in weed place. 16 IX 1999, N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, **NTH 3054** (HN!) **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Epiphytic and lithophytic creeping vine 10–20 cm hg, abundant. 23 X 1999, N.T.Hiep, P.K.Loc, L.Averyanov, **NTH 3808** (HN!, K, LE!).

23. *Epipogium* Gmel. ex Borkh.

23.81. *E. roseum* (D. Don) Lindl.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Rao An – Ngam Thiep village, 18° 22' N 105° 13' E, 900–1150 m, broad-leaved evergreen forest on southeastern slope. White saprophytic herb in weedy place. 1 V 1998, N.T.Hiep, L.Xiem, **VA 401** (HN!, MO). **N.Vietnam, Lai Chau** prov., **Sin Ho** distr., Ta Ngau mun., about 30 km of Lai Chau town to the N, 22°18'N 103°15'E, 1650 m, secondary open wet mossy evergreen broad-leaved forest with remnants of primary elements on rocky steep slope of remnant karst limestone ridge. Chlorophyllless yellowish-white saprophytic herb on steep slope, flowers yellowish-white, rare. 25 V 1999, N.T.Hiep, P.H.Hoang, L.Averyanov, **NTH 2786** (LE!).

24. *Eria* Lindl.

24.82. *E. apertiflora* Summerhayes

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte in shady places, not common. 12 XII 1998, L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tan, **CBL 1142** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic herb on shady vertical cliffs, abundant. 29 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1867** (AAU, HN!, LE!, MO). **N.Vietnam, Lao Cai** prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1500–1600 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphyte on mossy trees, not rare. 21–22 V 1999, N.T.Hiep, P.H.Hoang, L.Averyanov, **NTH 2712b** (LE!).

24.83. **E. carinata* Lindl.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, about 22 km from Cao Bang town to the N, 900–1000 m, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophyte on open mossy rocks, rare. 12 XII 1998, L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, **CBL 1136** (AAU, HN!, LE!, MO).

N.Vietnam, Ha Giang prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 40.7 km to 43° of Ha Giang town, 600–750 m, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on mossy open rocks and cliffs, common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3507* (HN!, K, LE!).

24.84. *E. corneri* Rchb. f.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Huy Giap mun., about 5 km to NW from Yen Lac village, 50 km to NWW from Cao Bang town, 22°44'N 105°50'E, 1400 m, secondary shrubs on steep shale slopes along road. Terrestrial and lithophyte on steep slopes of stream canyon, not common. 14 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 240* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 600 m, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Lithophyte on shady vertical cliffs, not rare. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 688* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 450–500 m, about 27 km to SE from Cao Bang town, primary evergreen broad-leaved closed dry forest on steep slopes and bluffs near tops of remnant limestone ridge. Lithophytic and epiphytic herb in shady wet places, not rare. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 884* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–400 m, primary evergreen broad-leaved closed wet forest along deep shady canyon of remnant limestone ridge. Lithophytic herb on steep shady waterfall cliffs, common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 950* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°48'N 106°17'E, 600–650 m, about 16 km from Cao Bang town to the N, secondary open broad-leaved forest and shrubs on alluvial valley between remnant limestone ridges. Lithophyte on shady limestone remnant rocks, not rare. 11 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1108* (AAU, HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2,5 km SW of Bong center, Vuon cave. Lithophytic herb on limestone rock in weed place, young fruits violet brown. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3006* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 300–400 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest on very steep rocky slopes of karst remnant limestone ridge. Lithophytic herb on shady cliffs, not rare. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3829* (HN!, K, LE!).

24.85. *E. coronaria* (Lindl.) Rchb. f.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte, flowers fine smelled, white, lip side lobes stripped with purple, epichile with yellow center, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 319* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr.,

Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophyte on mossy rocks, abundant. 28 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1796** (AAU, HN!, LE!, MO). id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophytic herb on shady mossy rocks, flowers white, lip with red-purple marks on side lobes and yellow on the disk, very common. 5 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3338** (HN!, K, LE!). id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophyte and epiphyte, young leaves pink-violet, abundant. 1 V 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1988** (AAU, HN!, LE!, MO). id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1500 m, 35.9 km to 27° of Ha Giang town, primary wet mossy mixed forest with *Tsuga chinensis* on very steep slope of karst remnant limestone ridge. Lithophyte, flowers pleasant strong smelled, tepals white, side lobes of the lip with purple stripes, epichile with yellow center, abundant. 9 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3446** (HN!, K, LE!).

24.86. *E. gagnepanii* A.D. Hawkes et A.H. Heller

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Nga doi, 18°30'N 105°14'E, 330 m, primary forest. Climbing herb, inflorescence brown-violet. 18 V 1998, N.T.Hiep, P.K.Loc, N.Q.Binh, T.T.Phuong, L.Xiem, **VA 698** (HN!, MO).

24.87. *E. paniculata* Lindl.

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Ngam Thiep region, 18°21'N, 105°14'E, 1000–1200 m, primary mixed evergreen forest. Epiphyte, perianth green. 7 V 1998, N.T.Hiep, N.Q.Binh, L.Xiem, **VA 458** (HN!, MO).

24.88. *E. pannea* Lindl.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, not common. 12 XII 1998, L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, **CBL 1139** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 800–1000 m, 26.2 km to 2° of Ha Giang town. Primary wet evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Epiphyte on high trees, not rare. 12 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3567** (HN!, K, LE!).

24.89. *E. pubescens* (Hook.) Steud.

N.Vietnam, Ha Giang prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen

forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic and epiphytic creeping vine, flowers yellowish with reddish stripes, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3521* (HN!, K, LE!).

24.90. *E. pusilla* (Griff.) Lindl.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 700–750 m, 27 km to 55° of Bac Can town, primary evergreen mixed mossy forest with *Pseudotsuga brevifolia* along tops of karst remnant limestone ridge. Epiphyte on mossy old tree in shady cliff, flowers yellowish-white, not common. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3777* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination of *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Epiphyte and lithophyte, flowers pale yellow, very common. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1479* (AAU, HN!, LE!, MO); **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophytic creeping herb on vertical cliffs, common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 316* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, not common. 13 XII 1998, *T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1209* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte on *Pseudotsuga brevifolia*, not common. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1063* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphytic herb on mossy tree stems, flowers light greenish-white, not common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1782* (AAU, HN!, LE!, MO); id., **Tam Dao** distr., vicin. of Tam Dao town, 21°27'N 105°39'E, 950 m, secondary evergreen broad-leaved wet forest on very steep SW riolite slopes of Tam Dao ridge. Along waterfall cascade, creeping lithophyte on shady waterfall rocks, locally abundant. 6 VI 1999, *P.K.Loc, L.Averyanov, TD 9* (HN!, LE!). id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 35.9 km to 27° of Ha Giang town, 1450–1550 m, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3499* (HN!, K, LE!).

24.91. *E. siamensis* Schlechter

N.Vietnam, Ha Giang prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E,

600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on open mossy rocks, very common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3513* (HN!, K, LE!); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophytic herb on mossy shady rocks, flowers white, common. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3330* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 800–1100 m, 26.2 km to 2° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Epiphyte on high trees, very common, also as lithophyte along tops of ridge. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3566* (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Ngam Thep region, 18°21'N, 105°14'E, 1150 m, primary mixed evergreen forest. Epiphyte. 7 V 1998, *N.T.Hiep, N.Q.Binh, L.Xiem, VA 463* (HN!, MO).

24.92. *E. sutepensis* Rolfe ex Downie

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., vicin. Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, 1350–1450 m, about 38 km to NWW from Cao Bang town. Old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Epiphyte, common. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 549* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophyte on open mossy rock outcrops, very common, flowered under cultivation in Hanoi at 17 VI 1999, flowers not smelled, tepals yellowish-white, lip yellow with purple margin, anther purple. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1991* (AAU, HN!, LE!, MO). **N.Vietnam, Son La** prov., **Moc Chau** distr., Chieng Hac mun., vicin. of Co Liu village, 20°51'N 104°38'E, 1200–1240 m, primary evergreen broad-leaved wet mossy forest along rocky tops of remnant karst limestone ridge. Epiphytic herb on mossy trees, very common. 29 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2987* (HN!, LE!).

24.93. *E. thao* Gagnep.

Ha Tinh prov., **Huong Son** distr., Ngam Thep region, 18°22'N, 105°14'E, 1150–1200 m, primary mixed evergreen forest. Epiphyte. 7 V 1998, *N.T.Hiep, N.Q.Binh, L.Xiem, VA 465* (HN!, MO).

25. *Eulophia* R. Br. ex Lindl.

25.94. *E. nuda* Lindl.

N.Vietnam, Lao Cai prov., **Sa Pa** distr., S slope of Hoang Lien Son ridge, 1900 m, secondary middle short tall grasslands along road from Sa Pa to Lai Chau, in wet place. Flowers odorless, tepals pink-violet, sepals with deep purple veins, lip pinkish-

violet, with numerous deep purple-violet veins and yellow center, column pink-violet, anther deep violet, rare. 18 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2661* (HN!, LE!).

26. *Flickingeria* Hawkes

26.95. *F. fimbriata* (Blume) Hawkes

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 650–700 m, about 50 km to E from Cao Bang town, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic shrublet up to 0.5 m hg, not common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 635* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, 550 m, about 39 km to SSE from Cao Bang town, primary broadleaved semideciduous forest along tops of remnant limestone ridge. Lithophyte and epiphyte, very common, sporadically abundant. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 810* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Rao An – Ngam Thep village, 18°22'N 105°13'E, 197–300 m, broad-leaved evergreen forest, in valley. Lithophyte on rock, flower yellow with violet marking. 13 IV 1992, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 9* (HN!, LE!, MO); id., **Huong Son** distr., Son Kim mun., 18°24'N 105°13'E, 200–220 m, primary forest along Rao Anh river. Epiphyte on tree branches along stream, rhizomes and pseudobulbs yellow-green, outer tepals yellow with dull red markings, labellum cream-white, yellow on tip, pedicel dull yellow. 13 VI 1999, *D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, 4402/HS-261* (HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Vuon cave, SW 2,5 km of Bong village, 350 m, limestone weed forest. Lithophyte in weed place. *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, 16 IX 1999, NTH 3053* (HN!); id., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Epiphyte on tree in weed place. 17 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3073* (HN!).

27. *Galeola* Lour.

27.96. *G. nudifolia* Lour.

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system at 1000–1100 m, 23°56'N 105°13'E, secondary broad-leaved wet evergreen forest with remnants of primary elements on shale very steep slopes. Chlorophyllless saprophyte with erect reddish-purple stem 2–4 m hg (later vine up to 8 m lg) in open place among bamboo, flowers brightly yellow, lip lobes with red hairs, column yellow, anther reddish-orange, rare. 3 V 1999 *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2090* (AAU, HN!, LE!, MO). **N.Vietnam, Lao Cai** prov., **Sa Pa** distr., near Tram Tau village, N slope of Hoang Lien Son ridge, 22°20'N 103°50'E, 1950–2000 m, secondary broad-leaved evergreen wet forest with remnants of primary elements on shales. Erect chlorophyllless saprophyte herb with reddish-brown stem up to 2.5 m hg on open slope with bamboo, flowers dull yellow, lip yellow, side lobes of gypochile with reddish stripes, occasionally common. 18 V 1999, *N.T.Hiep, P.H.Hoang,*

L.Averyanov, **NTH 2650** (HN!, LE!); id., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 2200 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Chlorophyllless saprophyte reddish erect herb up to 3 m hg on shady rocky wet stream slope, flowers yellow, rare. 21–22 V 1999, *N.T.Hiep*, *P.H.Hoang*, *L.Averyanov*, **NTH 2867** (HN!, LE!).

28. *Gastrochilus* D. Don

28.97. *G. minutiflorus* Aver.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 650 m, about 21 km from Cao Bang town to the N, primary closed evergreen broad-leaved wet forest on steep slopes and cliffs of remnant limestone ridge. Epiphyte, rare. 10 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 1040** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lakes, 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Pendulous herb on rocks and low branches of trees, leaves green, speckled in purple especially at margin and along midrib, inflorescence stalk white speckled with red-purple, upper petals orange-yellow with red spots, labellum similar but edged in white, inner labellum white with red spots long the edge, rostellum light yellow, rare. 7 IV 1998, *D.K.Harder*, *P.K.Loc*, *T.T.Tai*, **DH 4338** (HN!, MO)

28.98. *G. pseudodistichus* (King et Pantl.) Schlechter

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Small lithophytic vine, very common. 15 XI 1998, *L.Averyanov*, *N.T.Hiep*, *P.K.Loc*, *N.X.Tam*, **CBL 320** (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, 1350–1450 m, about 38 km to NWW from Cao Bang town, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Lithophytic vine up to 50 cm lg, tepals pale yellowish with fine purple-brownish marks, lip epichile white with violet tint, common. 21 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 556** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophytic creeping vine 20–30 cm lg, common. 28 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1803** (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic creeping vine up to 0.5 m lg, common. 29 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1861** (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen

Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Small lithophytic vine, common on mossy rock outcrops. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1989* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1550 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Lithophytic herb on mossy rocks, flowers yellowish with purple marks, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3493* (HN!, K, LE!).

29. *Geodorum* G. Jackson

29.99. *G. attenuatum* Griff.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 300–400 m, secondary evergreen broad-leaved closed forest among limestone rocks on alluvial valley and on foothills of remnant limestone ridges. Terrestrial herb with inflorescence up to 0.4 m lg, in open place, not common. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 697* (AAU, HN!, LE!, MO).

30. *Goodyera* R. Br.

30.100. *G. fumata* Thwaites

N.Vietnam, Ha Giang prov., along road between Quan Ba and Yen Minh towns, swampy open place among secondary shrubs on alluvial shale slope along road, 600 m. Terrestrial herb up to 0.8 m hg, not common. 4 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3276* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Dan village, 9 km to Bong Fray Head Quarters, forest dominated by *Streblus macrophyllus*. Herb to 30 cm tall, inflorescence peduncles light pink with a little green, petals light pink, labellum yellow. 20 VI 1999, *M.A.Jaramillo, R.Callejas, N.T.Hiep, N.M.Cuong, MAJ 514* (HN!); id., **Nho Quan** distr., Cuc Phuong national park, Near Bong village. Succulent herb, 30–40 cm tall, fruit pale green. 21 VII 1999, *N.M.Cuong, H.L.Quyen, NMC 289* (HN!).

30.101. *G. hispida* Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town. Primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial and lithophytic herb in shady rock crevices, leaves deep green with white nerves and silver-green central stripe, not common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 310* (AAU, HN!, LE!, MO); id., Nguyen Binh distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Terrestrial and lithophytic creeping herb in shady places, leaves deep green with golden veins and silver-green central longitudinal stripe, not common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1304b* (LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park,

limestone massif, 100–400 m. Terrestrial creeping herb in shady places, leaves velvety very deep-green with white venation and light green median stripe, not common. 1999, *N.T.Hiep*, **NTH 3892** (HN!).

30.102. *G. procera* (Ker.-Gawl.) Hook.

N.Vietnam, Bac Can prov., Ngan Son distr., Wind Pass on road Hanoi – Cao Bang, 22°25'N 105°55'E, 700 m. Terrestrial herb on wet clay-lateritic soil on shales among limestone rocks in open secondary shrubs and short tall grasslands, flowers white, not rare. 11 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1259** (AAU, HN!, LE!, MO).

30.103. *G. schlechtendaliana* Rchb. f.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, about 44 km to NWW from Cao Bang town, 1500 m, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial and lithophytic herb in mossy pillows, leaves white spotted, common. 15 XI 1998, *L.Averyanov*, *N.T.Hiep*, *P.K.Loc*, *N.X.Tam*, **CBL 311** (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Terrestrial and lithophytic herb in mossy places, leaves with white tessellation, common. 19 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1580** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic (sometimes also epiphytic) herb on mossy places, leaves white/green tessellated, common. 28 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1799** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ta Phin mun., vicin. of Sa Tung Chu village, 23°11'N 105°17'E, 1300 m, 51.5 km to 38° of Ha Giang town, remnants of primary mossy mixed and coniferous forest with *Pseudotsuga brevifolia* on tops of remnant limestone karst ridge. Terrestrial herb in mossy shady places, leaves white tessellated, flowers white, not common. 6 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3370** (HN!, K, LE!). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1550 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Terrestrial herb on very steep shady slope, leaves with white tessellation, flowers white, common. 9 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3495** (HN!, K, LE!).

30.104. **G. viridiflora* (Blume) Blume

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, 600–650 m, about 43 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Terrestrial herb in

shady canyons, common. 28 XI 1998, *L.Averyanov*, *P.K.Loc*, **CBL 752** (AAU, HN!, LE!, MO); id., **Yen Lac** distr., primary shady forest on limestone, 700 m. XI 1998, *L.Averyanov*, *P.K.Loc*, *sine no* (LE!).

31. *Habenaria* Willd.

31.105. *H. ciliolaris* Kraenzl.

N.Vietnam, **Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Bong village, limestone forest. Terrestrial herb, stem pale green with white hairs, bracts pale green, flowers greenish-white. 8 VIII 1999, *N.M.Cuong*, *M.V.Sinh*, *H.L.Quyen*, **NMC 421** (HN!).

31.106. *H. dentata* (Sw.) Schlechter

N.Vietnam, **Cao Bang** prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, 1250–1300 m, about 42 km to NWW from Cao Bang town, secondary evergreen wet closed broad-leaved forest on alluvial foothills of limestone remnant ridge. Herb up to 1 m hg in wet open place, rare. 18 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 409** (HN!, LE!).

31.107. *H. rhodocheila* Hance

N.Vietnam, **Son La** prov., **Moc Chau** distr., Chieng Hac mun., vicin. of Co Liu village, 20°51'N 104°38'E, 550–600 m, remnants of primary evergreen broad-leaved forests on vertical limestone bluffs along Xap river canyon. Lithophytic herb in crevices of vertical limestone cliffs, not rare. 28 V 1999, *N.T.Hiep*, *P.H.Hoang*, *L.Averyanov*, **NTH 2927** (HN!, LE!).

31.108. *H. tonkinensis* Seidenf.

N.Vietnam, **Ha Tinh** prov., **Huong Son** distr., Rao An – Ngam Thep village, 18°22'N, 105°13'E, 197 m. Herb on rock along stream, flowers white. 18 IV 1998, *N.T.Hiep*, *N.K.Dao*, *T.P.Anh*, *L.Xiem*, **VA 165** (HN!, MO); id., **Huong Son** distr., Rao An – Ngam Thep village, 18°21'N, 105°14'E, 900–1150 m, broad-leaved evergreen forest with *Fokienia hodginsii* and *Dacrycarpus imbricatus*. Terrestrial herb in weedy place, tepals white. 22 IV 1998, *N.T.Hiep*, *N.K.Dao*, *P.K.Loc*, *V.V.Can*, **VA 316** (HN!, MO).

32. *Holcoglossum* Schlechter

32.109. **H. wangii* Christenson

N.Vietnam, **Bac Can** prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not rare. 19 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3665** (HN!, LE!). **N.Vietnam**, **Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1100 m, about 44 km to NWW from Cao Bang town, primary broad-leaved forest remnants along stream on alluvial valley among limestone ridges. Epiphyte, tepals white with purple-violet tint near the tips, lip gypochile yellow with purple-brownish stripes and spots, epichile white, at the base with central yellow spot and with violet-purple side spots and marks, not too

rare. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 449* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Epiphyte, flowers odorless, white, gypochile yellow with brown stripes, base of white epichile with yellow and purple keels, not rare. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 957* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, rare. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1941a* (LE!).

33. *Hygrochilus* Pfitz.

33.110. *H. parishii* (Veitch et Rehb. f.) Pfitz.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3671* (HN!, LE!). **N.Vietnam, Cao Bang** prov., **Thach An** distr., Thai Cuong mun., 22°21'N 106°27'E, 500–550 m, about 3.9 km to SSE from Cao Bang town, primary semideciduous broad-leaved forest on steep slopes and bluffs of remnant limestone ridge. Epiphyte on high tree, not common. 3 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 851* (AAU, HN!, LE!, MO); id., **Thach An** distr., Van Trinh mun., 22°21'N 106°27'E, 600 m, about 39 km to SSE from Cao Bang town, secondary open semideciduous broad-leaved forest on steep slopes near tops of remnant limestone ridge. Epiphyte on high trees, not common. 3 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 849/3* (LE!); **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, not common. 13 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1208* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic shrub up to 1 m hg on open mossy rocks, very common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3519* (HN!, K, LE!).

34. *Liparis* Rich.

34.111. *L. averyanoviana* Szlach.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 650–700 m, about 50 km to E from Cao Bang town, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic herb on steep slopes and bluffs, flowers light

greenish, rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 649* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, 500–600 m, about 43 km to E from Cao Bang town, secondary evergreen broad-leaved closed forest on steep bluffs of remnant limestone ridges. Lithophyte on open rock outcrops. Flowers yellowish-green with orange-brownish spot on lip center, not rare. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 692* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, 550 m, about 39 km to SSE from Cao Bang town, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte on shady rocks, flowers light green, not common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 812* (AAU, HN!, LE!, MO); id., **Thach An** distr., Van Trinh mun., 22°21'N 106°27'E, 600 m, about 39 km to SSE from Cao Bang town, secondary open semideciduous broad-leaved forest on steep slopes near tops of remnant limestone ridge. Lithophytic herb on open rocks, flowers light green, common. 3 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 834* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Lithophyte on open rocks, flowers yellowish-green, not rare. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 960* (AAU, HN!, LE!, MO).

34.112. *L. balansae* Gagnep.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Epiphyte and lithophyte, flowers pale yellowish, not rare at 1300–1400 m. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 330* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Very common lithophytic herb. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1291* (AAU, HN!, LE!, MO).

34.113. *L. bootanensis* Griff.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte on vertical cliffs, flowers green (in buds), not rare at 1300–1400 m. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 331* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, 1350–1450 m, about 38 km to NWW from Cao Bang town, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Lithophytic herb on bluffy steep slopes, tepals yellowish-green, lip pale light yellowish-brown olive, not rare. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 558* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, 600–650 m, about 43 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis*

and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophyte on steep slopes, flowers yellow, not rare. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 749* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophyte on steep rocky slopes, common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1865* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophyte, very common. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1985* (AAU, HN!, LE!, MO).

34.114. *L. cordifolia* Hook.f. var. *cordifolia*.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Man Lung ridge, 22°47'N 105°49'E, 1400–1450 m, secondary mossy short tall grasslands on alluvial foothills of remnant karst limestone Man Lung ridge. Terrestrial herb in open place, rare. 18 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1545* (HN!, LE!).

34.115. *L. cordifolia* Hook.f. var. *argentopunctata* (Aver.) Aver.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, 2.5 km of Bong village to silvercloudy mountain on adventurous trail. Terrestrial herb 30 cm with one pale green leaf, flowers pale green to pale greenish-white, rare. 17 IX 1999, *N.M.Cuong, M.V.Sinh, H.L.Quyen, NMC 535* (HN!).

34.116. *L. delicatula* Hook. f.

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50', 1350 m, about 38 km to NWW from Cao Bang town, old wet broad-leaved semideciduous primary forest on steep slopes of remnant limestone ridge. Epiphyte, rare. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 561* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte in shady places, not common. 12 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1141* (AAU, HN!, LE!, MO).

34.117. *L. distans* C.B.Clarke

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 550–600 m, 27 km to 55° of Bac Can town, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Lithophytic herb in shady mossy rocks, common. 20 X 1999, *N.T. Hiep, P.K.Loc, L.Averyanov, NTH 3713* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte on steep slopes and cliffs, lip green, tepals yellowish-green, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc,*

N.X.Tam, **CBL 324** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic herb on shady steep bluffs, flowers orange, not common. 27 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 718** (AAU, HN!, LE!, MO); id., **Thach An** distr., Van Trinh mun., 22°21'N 106°27'E, 600 m, about 39 km to SSE from Cao Bang town, secondary open semideciduous broad-leaved forest on steep slopes near tops of remnant limestone ridge. Lithophytic herb on steep slopes, flowers olive-green, not rare. 3 XII 1998, *L.Averyanov*, *N.Q.Binh*, *P.K.Loc*, *N.X.Tam*, **CBL 849/4** (LE!); id., **Thach An** distr., about 25 km to SSE from Cao Bang town, 22°27'N 106°22'E, 500 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Terrestrial and lithophytic herb on open rocks and cliffs, flowers olive-green-brown, common. 5 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.X.Tam*, **CBL 919** (AAU, HN!, LE!, MO). **N.Vietnam**, **Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1200–1300 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Lithophyte on shady rocks, flowers light greenish, very common. 9 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3465** (HN!, K, LE!).

34.118. *L. mannii* Rchb. f.

N.Vietnam, **Bac Can** prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophyte on shady rocks, very common. 19 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3667** (HN!, K, LE!). **N.Vietnam**, **Cao Bang** prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Lithophytic herb on rock outcrops, flowers pale yellowish-green, cucumber smelled, very common. 13 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1301** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophyte on vertical cliffs, common. 12 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *P.K.Loc*, *N.X.Tam*, **CBL 1135** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophytic herb on open rocks, flowers pale green, common. 13 XII 1998, *N.T.Hiep*, *N.Q.Binh*, *P.K.Loc*, *N.X.Tam*, *L.Averyanov*, **CBL 1214** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lakes, 22°45'N 106°18'E, 666 m, disturbed forest on solid limestone rock. Epiphyte and lithophyte, under light shade, leaves light green, petals appear light green-orange, young fruit light green, occasional. 6 IV 1998, *D.K.Harder*, *P.K.Loc*, *T.T.Tai*, **DH 4278** (HN!, MO). **N.Vietnam**, **Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary

mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic herb on shady vertical cliffs, abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1869* (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophyte and epiphyte, very common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3581* (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1550 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, not rare. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3505* (HN!, K, LE!).

34.119. *L. nervosa* (Thunb.) Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., about 5 km to NW from Yen Lac village, 22°44'N 105°50'E, 1500–1580 m, about 50 km to NWW from Cao Bang town, old secondary closed broad-leaved wet cloud forest on steep slopes and cliffs along top of Nam Linh limestone ridge. Terrestrial and lithophytic herb in shady places, common. 19 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 496* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Dinh Phung mun., Nam Linh mt., 22°47'N 105°49'E, 1550–1600 m, old secondary broad-leaved wet mossy cloud forest along tops of remnant karst limestone Nam Linh ridge. Terrestrial and lithophytic herb in deep wet karst shady crevices and depressions, common. 15 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Rao An – Ngam Thiep village, 18°22'N 105°13'E, 197–300 m, broad-leaved evergreen forest, in valley. Terrestrial herb in wet place, flowers green. 13 IV 1992, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 20* (HN!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Dan village, 9 km to Bong Fray Head Quarters, forest dominated by *Streblus macrophyllus*. Herb to 60 cm tall, common. 19 VI 1999, *M.A.Jaramillo, R.Callejas, N.T.Hiep, N.M.Cuong, MAJ 498* (HN!); id., 2.5 km SW of Bong village, Vuon cave, limestone weed forest. Terrestrial herb in weed place. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3008* (HN!); id., May Bac peak, 500 m. Terrestrial herb. 18 IX 1999, *N.T.Hiep, N.X.Tam, N.V.Du, NTH 3106* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Terrestrial herb among shady rocks, not common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3821* (HN!, K, LE!).

34.120. *L. petelotii* Gagnep.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, 2.5 km SW of Bong center, Vuon cave, 350 m, limestone weed forest. Lithophytic herb in weed place. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3047, NTH 3048* (HN!); id., May Bac peak, 500 m. Lithophyte, flower with labellum orange

to brown-green. 18 IX 1999, *N.T.Hiep, N.X.Tam, N.V.Du, NTH 3091* (HN!).

34.121. *L. stricklandiana* Rchb. f.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 600–750 m, 27 km to 55° of Bac Can town, primary evergreen mixed mossy forest with *Pseudotsuga brevifolia* and bamboo along tops of karst remnant limestone ridge. Lithophytic herb on shady rocks, abundant. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3727* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, 1400–1450 m, about 42 km to NWW from Cao Bang town, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Lithophyte, flowers green, old – yellowish, abundant. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 398* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte on steep slopes and cliffs, very common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 323* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system at 1000–1100 m, 23°56'N 105°13'E, primary evergreen broad-leaved very wet mountain forest on shale very steep slopes. Epiphyte, very common. 3 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2095* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Rao An – Ngam Thep village, 18°23'N 105°13'E, 197–300 m, broad-leaved evergreen forest, in valley. Epiphyte on rock. 13 IV 1992, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 10* (HN!, MO). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 300–450 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest on very steep rocky slopes of karst remnant limestone ridge. Lithophytic on shady rocks, flowers light green, very common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3800* (HN!, K, LE!).

34.122. *L. viridiflora* (Blume) Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1100 m, about 44 km to NWW from Cao Bang town, secondary open shrubs among limestone rocks on alluvial foothills of limestone remnant ridge. Lithophyte on open rocks, flowers yellowish-green, not common. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 448* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 400 m, secondary evergreen forest on alluvial valley among limestone rocks on foothills of remnant limestone ridges. Lithophytic herb on open steep bluffs, flowers yellowish or pale green, common. 24 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 597* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic herb on open rocks, flowers pale green, very common at 500–600 m. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 720* (AAU, HN!, LE!, MO); id., **Thach**

An distr., about 25 km to SE from Cao Bang town, 22°27'N 106°22'E, 350–400 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Lithophyte on open rocks, flowers pale light-green, very common on mt slopes. 5 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 921* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Dong Van distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on open mossy rocks, very common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3520* (HN!, K, LE!). **N.Vietnam, Thai Nguyen prov., Vo Nhai distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 300 m, 23.3 km to 18° of Thai Nguyen town, primary dry broad-leaved evergreen forest on very steep rocky slopes of remnant karst limestone ridge. Epiphyte on mossy trees and occasional lithophyte, not common. 24 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3877* (HN!, K, LE!).****

35. *Ludisia* Rich.

35.123. *L. discolor* (Ker-Gawl.) A. Rich.

N.Vietnam, Ha Tinh prov., Huong Son distr., Ngam Thep, 18°22'N 105°13'E, 900–1150 m. Herb on rock, weedy place. 3 V 1998, *N.T.Hiep, L.Xiem, VA 429* (HN!, MO); id., **Huong Son distr., Ngam Thep, 18°22'N 105°13'E, 197–240 m, wet sand slope. Herb 5–10 cm tall, leaves deep green on upper surface, brown-red underneath. 23 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 858* (HN!, MO); id., **Huong Son distr., Rao An – Ngam Thep village, 18°23'N 105°13'E, 197–300 m, broad-leaved evergreen forest, in valley. Epiphyte on rock, common, wet place. 13 IV 1992, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 12* (HN!, MO).****

36. *Luisia* Gaudich.

36.124. *L. appressifolia* Aver.

N.Vietnam, Cao Bang prov., Nguyen Binh distr., Ca Thanh mun., vicin. Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, 1350–1450 m, about 38 km to NWW from Cao Bang town, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Epiphyte on mt tops, not common. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 544* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Dong Van distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, tepals green with dirty purple tint, lip deep black-violet, not common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1802* (AAU, HN!, LE!, MO); id., **Yen Minh distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, not****

common. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1941* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1500 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, not common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3480* (HN!, K, LE!).

36.125. *L. morsei* Rolfe

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, not rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 711* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thai Cuong mun., 22°21'N 106°27'E, 500–550 m, about 39 km to SSE from Cao Bang town, primary semideciduous broad-leaved forest on steep slopes and bluffs of remnant limestone ridge. Epiphyte, not common. 3 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 852* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 894* (AAU, HN!, LE!, MO). **N.Vietnam, Quang Ninh** prov., **Hon Gai** distr., Halong bay, Dan Go island, secondary broad-leaved evergreen forest on steep limestone slopes and vertical bluffs on elevations 0–100 m. Epiphyte at the mossy base of large trees on top of ridge, flowers dirty yellow, lip with dull purple marks, not common. 12 V 1999, *N.T.Hiep, L.Averyanov, NTH 2635* (HN!, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 250 m, 23.3 km to 18° of Thai Nguyen town, secondary dry evergreen broad-leaved forest with bamboo on tops of remnant karst limestone ridge. Epiphyte on mossy trees on top of ridge, not rare. 22 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3774* (HN!, K, LE!).

37. *Malaxis* Soland. ex Sw.

37.126. *M. acuminata* D.Don

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophyte on shady rocks, very common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3668* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Terrestrial herb on shady wet canyons, not common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 731* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Terrestrial herb among shady rocks in wet places, leaves pink-purple, not rare. 13 IV

1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1308* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Terrestrial herb in shady places, leaves deep violet, flowers deep violet, not common. 19 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1581* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Terrestrial and lithophytic herb on shady places, common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3536* (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic herb in mossy shady places, leaves pink-purple or green with purple-violet longitudinal stripes, tepals dull pinkish, lip light yellowish-green, not rare. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1980* (AAU, HN!, LE!, MO). **N.Vietnam, Lang Son** prov., Huu Lien mun., Huu Lien protected area, between Deo Dat, 21°41'N 106°21'E, and Lan Dat, 21°41'N 106°20'E, in forest on limestone and schist, 115 m. Lithophytic and terrestrial herb, leaves light green with purple tinge, from succulent stems also tinged red-pink, buds red-pink, lower leaf sheath speckled purple-red, reflexed petals reddish-green, beak of labellum deep red-purple, rare. 2 IV 1998, *D.K.Harder, P.K.Loc, N.T.Hiep, N.Q.Binh, DKH 4100* (HN!, MO); id., Huu Lien mun., Huu Lien protected area, degraded forest on eroded quartz hills with bamboo, 21°40'N 106°23'E, 510 m. Between rocks in pockets of leaf litter, stems succulent, light green, leaf blade light purple-pink below, in bud only, buds pale yellow-green, tipped in pink, rare. 4 IV 1998, *D.K.Harder, P.K.Loc, N.T.Hiep, N.Q.Binh, DKH 4185* (HN!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2.5 km SW of Bong center, Vuon cave, 350 m, limestone weed forest. Lithophytic herb in weed place. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3050* (HN!).

37.127. *M. latifolia* J.E. Smith

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 400–450 m, 27 km to 55° of Bac Can town, secondary broad-leaved evergreen closed forest on steep shale slopes of foothills of limestone ridge. Terrestrial herb on steep slope, rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3692* (HN!).

38. *Micropera* Lindl.

38.128. *M. poilanei* (Guillaum.) Garay

N.Vietnam, Lang Son prov., Huu Lien mun., Huu Lien protected area, at Lan Dat, inundated forest area, cultivated fields mixed with inundated forest areas, forest under water during rainy season and extending onto limestone hills, disturbed, 21°41'N

106°20'E, 10 m. Occasional, epiphyte on tree, stems green with purple spots, inflorescence in bud only, light purple-cream. 2 IV 1998, *D.K.Harder, P.K.Loc, N.T.Hiep, N.Q.Binh, DKH 4133* (HN!, MO).

39. *Mischobulbon* Schlechter

39.129. *M. macranthum* (Hook. f.) Rolfe

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Rao An – Ngam Thep village, along stream, eastern slope, 18°22'N 105°13'E, 197–500 m. Herb, epiphyte on tree, along stream, flowers with light violet petals. 19 IV 1998, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 193* (HN!, MO). **N.Vietnam, Vinh Phuc** prov., **Tam Dao** distr., vicin. of Tam Dao town, 21°27'N 105°39'E, secondary evergreen broad-leaved wet forest on very steep SW rhyolite slopes of Tam Dao ridge, 950 m along waterfall cascade. Terrestrial prostrate herb on steep shady slopes, leaves with unclear deep green spots, flowers odorless, tepals light olive-brown, with deep brown veins, lip white, with numerous purple marks on side lobes, keels yellow, midlobe yellow, column white, with numerous purple small marks and yellow base, anther white, light greenish, common. 6 VI 1999, *P.K.Loc, L.Averyanov, TD 7, TD 19* (HN!, LE!).

40. *Monomeria* Lindl.

40.130. *M. barbata* Lindl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic and epiphytic creeping herb, abundant. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 741* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Creeping lithophytic vine up to 1.5 m lg, abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1864* (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Creeping lithophytic and epiphytic vine up to 1 m lg, very common, locally abundant. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3589* (HN!, K, LE!).

41. *Nephelaphyllum* Blume

41.131. *N. tenuiflorum* Blume

N.Vietnam, Ha Giang prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic creeping herb on shady cliffs, leaves above green with deep green tessellation, below pink-violet, not

rare. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3615** (HN!, K, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Terrestrial herb among shady rocks, leaves green, with deep green spots above, pink-violet below, not common. 23 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3822** (HN!, K, LE!). **N.Vietnam, Vinh Phuc** prov., **Tam Dao** distr., vicin. of Tam Dao town, 21°27'N 105°39'E, secondary evergreen broad-leaved wet forest on very steep SW riolite slopes of Tam Dao ridge, 950 m along waterfall cascade. Terrestrial prostrate and lithophytic herb on shady steep slopes, leaves above green, with purple-violet spots, below light violet, flowers odorless, tepals green, with deep green veins, lip green, with deep green veins, keels white-greenish, column white, with ventral purple stripes, anther yellowish-white, with violet-purple spots on tips of horns, common. 6 VI 1999, *P.K.Loc*, *L.Averyanov*, **TD 17** (HN!, LE!).

42. *Nervilia* Gaudich.

42.132. **N. punctata* (Blume) Makino

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Terrestrial herb with whitish-pink stem, tepals dull pale olive, lip white with numerous small purple-violet marks, column and anther white, not rare. 13 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1279** (AAU, HN!, LE!, MO).

43. *Neuwiedia* Blume

43.133. *N. griffithii* Rchb. f.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Terrestrial herb 50 cm tall in weed place, ripe fruits orange. IX 1999 17, *N.T.Hiep*, *N.X.Tam*, *N.M.Cuong*, *M.V.Sinh*, , **NTH 3056** (HN!).

43.134. *N. inae* de Vogel

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, near Bong village. Terrestrial herb 30 cm tall, inflorescens in terminal spike, bracts pale greenish-white, fruit pale green. 30 VII 1999, *N.M.Cuong*, *H.L.Quyen*, **NMC 309** (HN!).

44. *Oberonia* Lindl.

44.135. *O. ensiformis* (J.E. Smith) Lindl.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophyte on shady cliffs, very common. 19 X 1999, *N.T.Hiep*, *P.K.Loc*, *L.Averyanov*, **NTH 3679** (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, 600 m,

about 43 km to E from Cao Bang town, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Lithophyte on open vertical cliffs, flowers yellow, not rare at 400–600 m alt. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 689* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophyte on vertical cliffs, flowers yellow-orange, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 732* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, 550 m, about 39 km to SSE from Cao Bang town, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Lithophyte on vertical bluffs, flowers green, common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 806* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic herb on shady vertical cliffs, flowers orange-yellow, very common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 890* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophyte on shady cliff, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3509* (HN!, K, LE!). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, 2,5 km SW of Bong center, 350 m, Vuon cave, limestone weed forest. Lithophytic herb in weed place. 16 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3049* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Lithophyte on shady cliff, flowers yellowish, common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3823* (HN!, K, LE!).

44.136. *O. evrardii* Gagnep.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 650–700 m, about 50 km to E from Cao Bang town, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphyte, not rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 639* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 712* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, not rare. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 891* (AAU, HN!, LE!, MO).

44.137. *O. cavaleriei* Finet (= *O. myosurus* Lindl.)

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con

village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophyte on shady cliffs of N exposition, common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3681* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte on shady vertical cliffs, not common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 327* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1300–1350 m, primary semideciduous broad-leaved forest on steep slopes and bluffs of N exposition of remnant karst limestone ridge. Lithophytic herb on shady vertical cliffs, not common, but locally abundant. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1369* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lake, 22°45'N 106°18'E, 666 m, disturbed forest on upper slope of solid limestone rock. Leaves green with white speckling, pendulous, inflorescences yellow-light orange, labellum shiny yellow-green, tepals transparent, yellow-green, occasional. 6 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4265* (HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., vicin. of Lung Tao village, 22°45'N 106°19'E, 600–800 m, about 12 km from Cao Bang town to the NNE, primary semideciduous open broad-leaved forest on steep slopes and bluffs of remnant limestone ridge. Lithophytic herb on shady vertical cliff, not rare. 14 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1255* (AAU, HN!, LE!, MO).

44.138. *O. falcata* King et Pantl.

N.Vietnam, Lao Cai prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1900 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphyte on mossy trees, not rare. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2839* (HN!, LE!).

45. *Ornithochilus* Wall. ex Benth.

45.139. *O. difformis* (Wall. ex Lindl.) Schlechter

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3683* (HN!, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 550–600 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of karst remnant limestone ridge. Epiphyte on mossy trees, not common. 24 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1700* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphyte, rare. 4 XII 1998,

L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 899 (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte, not rare. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1058* (AAU, HN!, LE!, MO).

46. *Otochilus* Lindl.

46.140. *O. albus* Lindl.

N.Vietnam, Lao Cai prov., Than Uyen distr., Ho Mit mun., 22°6'N 103°52'E, 1600–1700 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slopes. Creeping epiphytic vine 1–2 m lg on high trees, flowers white, column and anther greenish, not rare. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2686* (HN!, LE!); id., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1400–1500 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Epiphytic herb on mossy trees, flowers white, common. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2800* (HN!, LE!).

46.141. *O. pseudoporrectus* Aver.

N.Vietnam, Cao Bang prov., Bao Lac distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Epiphyte and lithophyte, flowers odorless, white, column yellowish-brown, not common. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 329* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte and lithophytic creeping vine 1–2 m lg, very common, sometimes abundant. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1860* (AAU, HN!, LE!, MO).

47. *Panisea* (Lindl.) Steud.

47.142. **P. yunnanensis* S.C. Chen et Tsi

N.Vietnam, Ha Giang prov., Yen Minh distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1450–1550 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Epiphyte on mossy trees, flowers white, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3497* (HN!, K, LE!).

48. *Paphiopedilum* Pfitz.

48.143. *P. concolor* (Batem.) Pfitz.

N.Vietnam, Lang Son prov., Huu Lung distr., Huu Lien mun., 21°40'N

106°22'E, 400–450 m, primary evergreen broad-leaved wet forest on steep slopes of remnant karst limestone ridge. Lithophytic herb on open rocks and cliffs of N exposition, leaves above glossy, white-green tessellated, uniformly deep violet-black below, not rare. 1 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3259* (HN!, K, LE!). **N.Vietnam, Quang Ninh** prov., **Hon Gai** distr., Halong bay, Dan Go island, secondary broad-leaved evergreen forest on steep limestone slopes and vertical bluffs on 0–100 m. Lithophytic herb on vertical shady cliffs of N exposition, leaves fine light-green/whitish tessellated from above, light greenish, fine spotted with violet from below, flowers fine apple-sweet smelled, sepals, petals and lip dull yellow, with numerous smallest purple marks, not rare. 12 V 1999, *N.T.Hiep, L.Averyanov, NTH 2631* (HN!, LE!). **N.Vietnam, Son La** prov., **Moc Chau** distr., Chieng Hac mun., vicin. of Co Liu village, 20°51'N 104°38'E, 550–600 m, remnants of primary evergreen broad-leaved forests on vertical limestone bluffs along Xap river canyon. Lithophytic herb on shady vertical limestone cliffs of N exposition, flowers dull yellow, tepals and lip inside with few sparsely purple smallest dots, leaves pale green with fine white tessellation above, dirty purple-violet spotted below, not rare on inaccessible vertical bluffs. 28 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2922* (HN!, LE!).

48.144. **P. dianthum* T. Tang et F.T. Wang

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, 1400–1450 m, about 42 km to NWW from Cao Bang town, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Lithophyte on open mossy rocks of SW exposition, flower sepal and synsepalum white with greenish stripes at the base, lateral petals and lip olive-green, petals with small deep brown warts and groups of black hairs along margin, rare. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 394* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ta Phin mun., vicin. of Sa Tung Chu village, 23°11'N 105°17'E, 1300 m, 51.5 km to 38° of Ha Giang town, remnants of primary mossy mixed and coniferous forest with *Pseudotsuga brevifolia* on tops of remnant limestone karst ridge. Lithophytic herb on very steep mossy open rocky slopes and cliffs, flowers of typical coloration, not common. 6 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3364* (HN!, K, LE!); id., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic herb on open mossy rocks and cliffs of N exposition, flowers of typical coloration, very rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3539* (HN!, K, LE!).

48.145. *P. helenae* Aver.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 700–750 m, 27 km to 55° of Bac Can town, primary evergreen mixed mossy forest with *Pseudotsuga brevifolia* along tops of karst remnant limestone ridge. Addressed lithophytic herb in crevices of shady mossy vertical cliff of N exposition, rare, but locally abundant. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3716* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., An Lac mun., vicin. of

Phia Deng village, 22°43'N 106°36'E, 600 m, about 36 km to E from Cao Bang town, primary open coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophytic herb on vertical shady cliffs of N exposition near tops of ridge, 600 m, not rare. 29 XI 1998, *L.Averyanov, P.K.Loc, CBL 789* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, to E from Cao Bang town, 600–650 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Lithophytic herb on shady vertical bluffs of N exposition near top of ridge, not common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 648* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Lithophytic herb on shady vertical cliffs of N exposition, very rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 744* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, 500 m, about 39 km to SSE from Cao Bang town, primary broad-leaved semideciduous forest on steep slopes near tops of remnant limestone ridge. Lithophytic herb on vertical shady cliffs of N exposition, not common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 830* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic herb in crevices of vertical shady cliffs of N exposition, common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 911* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophytic herb in crevices of vertical cliffs of N exposition, not common. 12 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1140* (AAU, HN!, LE!, MO).

48.146. *P. henryanum Braem

N.Vietnam, Ha Giang prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic herb on rocks crevices of shady cliff of N exposition, very rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3533* (HN!, K, LE!); id., **Meo Vac** distr., Shung Cha mun., vicin. of Lo Loi Phin village, 23°11'N 105°17'E, 1200–1250 m, coniferous primary mossy forest with domination of *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophyte on mossy shady cliff of S exposition, flowers of typical coloration, locally common. 5 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3323* (HN!, K, LE!); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophyte on shady vertical cliffs, locally very common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1875* (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing

Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic herb on very steep rocky slopes and cliffs mostly of SW exposition, flowers odorless, median sepal and synsepal pale green with brown-purple spots, petals light dull pink-purple with purple-brownish spots, lip pink-violet, staminode yellowish, locally abundant. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3590** (HN!, K, LE!).

48.147. *P. hirsutissimum* (Lindl.) Stein. var. ***chiwuanum*** (T. Tang et F.T. Wang) Cribb

N.Vietnam, Cao Bang prov., Bao Lac distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1300–1350 m, primary semideciduous broad-leaved forest on steep slopes and bluffs of N exposition of remnant karst limestone ridge. Lithophytic herb on shady vertical cliffs, flowers purple-violet with olive-greenish and brownish-purple, not common. 13 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1370** (AAU, HN!, LE!, MO); id., **Bao Lac distr., Yen Lac mun.,** vicin. of Yen Lac village, 22°44'N 105°50'E, 1300 m, primary open broad-leaved semideciduous forest on vertical cliffs of karst remnant limestone ridge of N exposition. Lithophytic herb on vertical cliffs, central sepal, synsepal and lip olive green with brown tint, lateral petals dull purple with olive green-brownish base, flowers odorless, rare, but occasionally abundant. 20 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1588** (AAU, HN!, LE!, MO).

48.148. *P. hirsutissimum* (Lindl.) Stein. var. ***esquirolei*** (Schlechter) Karasawa et Saito

N.Vietnam, Cao Bang prov., Ha Lang distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, about 43 km to E from Cao Bang town, 350–400 m, secondary evergreen broad-leaved closed forest on steep bluffs of remnant limestone ridges. Lithophytic herb on vertical shady cliffs of NW exposition, rare. 26 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 694** (AAU, HN!, LE!, MO); id., **Tra Linh distr., Quang Vinh mun.,** 22°51'N 106°14'E, 650–800 m, about 21 km from Cao Bang town to the N, primary evergreen closed wet forest on steep slopes and bluffs of remnant limestone ridge. Lithophytic herb on vertical shady cliffs at 700 m, not common. 9 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 982** (AAU, HN!, LE!, MO); id., **Ha Lang distr., Thang Loi mun.,** vicin. of Lung Sam village, 22°45'N 106°42'E, 550–600 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of karst remnant limestone ridge. Lithophytic herb on vertical cliffs of NW exposition, flowers of typical coloration, rare, but occasionally abundant. 24 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1677** (AAU, HN!, LE!, MO); id., **Tra Linh distr., Quoc Toan mun.,** Trang Hen lake, 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit, clinging to steep rock cliffs, in full sun and in understory, forming large clumps. Pedicel purple with purple hairs, upright and lower petals similar in shape, lower – pale green, upright – light green with purple tint and darker purple spotting near throat, linear row of spots medially, lateral petals light green near center, dark spotted purple at center, light purple on twisted portion, labellum saccate, light green with purple speckling, light green at upper

margin, deep purple spotted inside, central disk purple and green with purple hairs and shiny, occasional. 7 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4349* (HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic herb on open mossy rocks and shady cliffs, mostly of N exposition, common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3532* (HN!, K, LE!).

48.149. *P. malipoense* S.C. Chen et Z.H. Tsi

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Terrestrial herb on steep slope of N exposition with bamboo near the top of ridge, leaves above green-light green tessellated, below dirty violet spotted, very rare. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3705* (LE!). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic and terrestrial herb on very steep rocky mossy slopes, leaves with whitish-deep green tessellation, locally abundant both on slopes S and N exposition, occasional codominant of lithophytic herb communities. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3580* (HN!, K, LE!). **N.Vietnam, Lang Son** prov., **Huu Lung** distr., Huu Lien mun., 21°40'N 106°22'E, 400–450 m, primary evergreen broad-leaved wet forest on steep slopes of remnant karst limestone ridge. Terrestrial herb in shady deep canyon on very steep slope of N exposition, leaves above white-pale-green tessellated, dirty violet marked below, rare. 1 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3258* (HN!, K, LE!).

48.150. **P. micranthum* T. Tang et F.T. Wang

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Terrestrial and lithophytic herb in primary sedges (*Carex* sp.) communities on open rock outcrops of N and NW exposition of the top of ridge, tepals purple with yellow stripes, lip white with scarlet base and margins, staminode yellow with purple marks, not rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1477* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1400 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial and lithophytic herb on vertical bluffs and on tops of mt ridge in mossy clumps, not rare, sporadically abundant, mostly observed on slopes of N and NW exposition. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 332* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 650–700 m, about 50 km to E from Cao Bang town, open primary mixed mossy semideciduous and

coniferous forest along tops of limestone ridge. Lithophytic stoloniferous herb on steep bluffs of N exposition, leaves below finely spotted with deep dirty-violet, above finely contrast deep green-white tessellated, flower stalk 20–25 cm lg, not common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 627* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, 600–650 m, about 43 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis* and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophytic herb on vertical shady cliffs of N and NW exposition, leaves below heavily violet spotted, above with fine white – deep green tessellation, not rare, most typical habitat are narrow shelves below overhanging bluffs. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 767* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. Ca Lu village, about 7–8 km to SE from Yen Lac village, 22°44'N 105°50'E, 1350–1450 m, about 38 km to NWW from Cao Bang town, old open mixed semideciduous and coniferous with *Pseudotsuga brevifolia* primary forest along tops of limestone ridge and on steep slopes near ridge tops. Lithophytic and terrestrial stoloniferous herb (with underground stolones up to 25 cm lg) on bluffy steep slopes mostly of E exposition, leaves below heavily spotted with deep dirty violet, above deep green with fine white – deep green tessellation, not rare, dispersed and full pods are observed at Oct. – Nov. 21 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 555* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1350–1400 m, primary semideciduous mixed forest along tops of remnant karst limestone ridge. Terrestrial and lithophytic herb mostly on cliffs of N and W exposition near ridge tops, tepals pink with reddish-brown stripes, lip white with pink margin and base, not rare, but flowering samples not common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1277* (AAU, HN!, LE!, MO); id., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Terrestrial and lithophytic herb on steep slopes and vertical bluffs, mostly of N exposition, flowers odorless, petals purple or pink with yellow and deep purple stripes, central petal sometimes yellow with pale purple stripes, lip white with scarlet at the base and margin, not rare, occasionally abundant. 19 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1577* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophytic herb in shady rock crevices on vertical cliffs of N exposition, leaves above with fine deep green-white tessellation, below heavily spotted with dirty violet, rare. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1079* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic herb on steep slope mostly of SE exposition, leaves

and flowers of typical coloration, very common, occasionally abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1776* (AAU, HN!, LE!, MO); id., **Dong Van** distr., Ho Quang Phin mun., 23°11'N 105°15'E, 1250–1300 m, 48.2 km to 36° of Ha Giang town, remnants of dry mossy open coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone karst ridge. Lithophyte on shady cliffs, mostly of N exposition, leaves green-whitish tessellated above, deep violet below, very common. 6 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3346* (HN!, K, LE!); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1450 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic herb on steep slopes and vertical cliffs, flowers of typical coloration, very common, occasionally abundant, codominant of lithophytic herb communities, not common, in flowers. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1822* (AAU, HN!, LE!, MO); id., id., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 1200–1250 m, 48.2 km to 36° of Ha Giang town, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Terrestrial and lithophytic herb on mossy shady rocky steep slopes and cliffs, mostly of N exposition, leaves white-green tessellated above, heavy violet spotted below, locally common. 7 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3432* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Lithophytic and terrestrial herb on very steep rocky mossy slopes, leaves with whitish-deep green tessellation, locally abundant both on slopes S and N exposition, occasional codominant of lithophytic herb communities. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3576* (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial, lithophytic and occasionally epiphytic (growing on mossy stems of old trees near the base) herb, leaves deep green/white tessellated above, dirty violet spotted below, flowers of typical coloration, very common, usual codominant of lithophytic herb communities. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1940* (AAU, HN!, LE!, MO); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1400–1500 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Lithophytic and terrestrial herb on very steep rocky slope, leaves with white green tessellation above, dirty violet spotted below, common. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3494* (HN!, K, LE!).

49. *Pelatantheria* Ridl.

49.151. *P. insectifera* (Rchb. f.) Ridl.

N.Vietnam, Cao Bang prov., Ha Lang distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town. Primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphytic and lithophytic vine 0.5–1 m lg, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 717* (AAU, HN!, LE!, MO); id., **Thach An distr., Duc Xuan mun.,** 22°21'N 106°27'E, 550 m, about 39 km to SSE from Cao Bang town, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte and lithophyte on open rocks, very common, sporadically abundant. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 797* (AAU, HN!, LE!, MO); id., **Thach An distr., Thuy Hung mun.,** vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic vine up to 1.5 m lg in open rocks, common, sporadically abundant. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 910* (AAU, HN!, LE!, MO). **N.Vietnam, Thai Nguyen prov., Vo Nhai distr., Than Sa mun.,** vicin. of Kim Son village, 21°48'N 105°54'E, 250 m, 23.3 km to 18° of Thai Nguyen town, secondary dry evergreen broad-leaved forest with bamboo on tops of remnant karst limestone ridge. Epiphytic creeping vine 15–30 cm lg on mossy trees on top of ridge, not rare. 22 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3773* (HN!, K, LE!).

50. *Phaius* Lour.

50.152. *Ph. flavus* (Blume) Lindl.

N.Vietnam, Cao Bang prov., Bao Lac distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial herb in shady canyons, leaves uniformly green or yellow spotted, not rare. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 325* (AAU, HN!, LE!, MO); id., **Bao Lac distr., Yen Lac mun.,** vicin. of Yen Lac village, 22°44'N 105°50'E, 1450–1500 m, primary mixed semideciduous forest with domination of *Pseudotsuga brevifolia* along tops of remnant karst limestone ridge. Terrestrial herb in shady places, leaves green, with numerous yellow spots, tepals white, with green tint, lip white, yellowish, side lobes inside with brownish stripes, epichile margin brownish, column and anther white, not rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1478* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang prov., Meo Vac distr., Sung Chang mun.,** vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Terrestrial and lithophytic herb on rocky slopes of deep canyon, leaves with yellow numerous marks, not rare. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1856* (AAU, HN!, LE!, MO); id., **Yen Minh distr., Lao Va Chai mun.,** vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Terrestrial herb up to 1.5 m hg in shady places, leaves yellow spotted, tepals yellow, not common. 1 V 1999, *P.K.Loc, P.H.Hoang,*

L.Averyanov, **CBL 1983** (AAU, HN!, LE!, MO).

50.153. *Ph. tankerwilleae* (Banks ex L. Her.) Blume

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., 22°44'N 105°50'E, 1000 m. Terrestrial herb with inflorescence up to 1.5 m hg in open place on wet clay-lateritic soil on shales in open secondary shrubs and short tall grasslands, flowers odorless, tepals outside white, inside brownish-purple, lip deep purple-violet, not rare. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1262* (AAU, HN!, LE!, MO).

50.154. **Ph. longicuris* Tsi (= *Ph. tonkinensis* (Aver.) Aver.)

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 500–600 m, 27 km to 55° of Bac Can town, primary broad-leaved evergreen dry closed forest on very steep slopes of remnant karst limestone ridge. Terrestrial herb up to 1 m hg in shady place among rocks, flowers odorless, tepals white, tips with green tint, lip pink-violet, later yellow, very common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3687* (HN!, K, LE!); id., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 600–700 m, 27 km to 55° of Bac Can town, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Lithophytic herb on shady rocks, flowers odorless, tepals white, tips with green tint, later yellowish, lip light lilac-violet with whitish irregular venation, very common. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3732* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 650 m, about 21 km from Cao Bang town to the N, primary closed evergreen broad-leaved wet forest on steep slopes and cliffs of remnant limestone ridge. Terrestrial herb up to 1.5 m hg in shady steep slopes. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1031* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., vicin. of Lung Tao village, 22°45'N 106°19'E, 600–800 m, about 12 km from Cao Bang town to the NNE, primary semideciduous open broad-leaved forest on steep slopes and bluffs of remnant limestone ridge. Terrestrial herb in shady place, not common. 14 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1253* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 800–1000 m, 26.2 km to 2° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Terrestrial herb up to 1 m hg, not rare. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3563* (HN!, K, LE!). **N.Vietnam, Lang Son** prov., **Huu Lung** distr., Huu Lien mun., 21°40'N 106°22'E, 250–300 m, primary evergreen broad-leaved wet forest on steep slopes of remnant karst limestone ridge. Terrestrial and lithophytic herb up to 1.5 m hg, tepals white, lip purple-lilac, with whitish marks, column white with pink tint at front, not common. 1 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3255* (HN!, K, LE!).

51. *Phalaenopsis* Blume

51.155. *Ph. mannii* Rehb. f.

N.Vietnam, Cao Bang prov., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Epiphyte in very wet shady place, not common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 961/1* (LE!); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lakes, 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Rare. 7 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4337* (HN!, MO).

52. *Pholidota* Lindl. ex Hook.

52.156. *Ph. articulata* Lindl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 650–700 m, about 50 km to E from Cao Bang town, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphytic vine up to 1 m lg, common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 633* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 729* (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Epiphytic and lithophytic small vine up to 1.5 m lg on open slopes, common. 4 XII 1998, *L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, CBL 902* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphytic vine up to 2 m lg, very common. 13 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1215* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophytic herb or small vine up to 1 m lg, not rare. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1054* (AAU, HN!, LE!, MO).

N.Vietnam, Ha Giang prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Creeping epiphytic vine 1.5–2 m lg, abundant. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1800* (AAU, HN!, LE!, MO); id., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 1200–1250 m, 48.2 km to 36° of Ha Giang town, remnants of primary open mossy wet mixed forests with *Pseudotsuga brevifolia* along tops of limestone karst remnant ridge. Lithophytic vine up to 1 m lg on open mossy rocks, very common. 7 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3438* (HN!, K, LE!).

52.157. *Ph. chinensis* Lindl.

N.Vietnam, Cao Bang prov., **Nguyen Binh** distr., Ca Thanh mun., vicin. of Ta Phinh village, 22°44'N 105°50'E, 1350–1400 m, primary open semideciduous mixed mossy forest with *Pseudotsuga brevifolia*, *Tsuga chinensis* and *Pinus kwangtungensis* along tops of remnant karst limestone ridge. Epiphyte in shady place, flowers white, rare. 19 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1578* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lake, 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Pseudobulbs persistent, deeper green than leaves, inflorescence stalk light white, bract brown, patch almost all white becoming brown, occasional, locally abundant. 7 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4342* (HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 650–800 m, about 21 km from Cao Bang town to the N, primary evergreen closed wet forest on steep slopes and bluffs of remnant limestone ridge. Epiphyte in shady place, rare. 9 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 989* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Ngam Thiep region, 18°21'N 105°14'E to 18°21'N 105°15'E, 900–1000 m, primary broad-leaved evergreen forest mixed with needle-leaved forest. Epiphyte on tree. 7 V 1998, *N.T.Hiep, N.Q.Binh, L.Xiem, VA 459* (HN!, MO).

52.158. *Ph. guibertiae* Finet

N.Vietnam, Ha Tinh prov., **Huong Son** distr., from Ngam Thiep to Rao An village, 18°22'N 105°14'E, 900–1150 m, secondary forest in open places and along streams. Epiphyte on tree, sepal light brown, very common. 27 IV 1998, *V.V.Can, VA 367* (HN!, MO); id., **Huong Son** distr., Son Kim mun., Huong Son forest enterprise, along Rao Anh river, 18°25'N 105°13'E, 200–220 m, primary forest. Epiphyte on low branches of trees along stream, petals dull orange, deeper inside, rare, 13 VI 1999, *D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, 4385/HS-244* (HN, LE!, MO).

52.159. **Ph. missionariorum* Gagnep.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, 1400–1450 m, about 42 km to NWW from Cao Bang town, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, flowers pale pink, anther orange, abundant. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 406* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Dinh Phung mun., Nam Linh mt., 22°47'N 105°49'E, 1550–1600 m, old secondary broad-leaved wet mossy cloud forest along tops of remnant karst limestone Nam Linh ridge. Epiphyte, very common. 15 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1404* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Epiphyte and lithophyte, flowers pale pinkish, anther orange, very common, especially on tops of ridge. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 309* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1550–1600 m, primary

very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, very common. 28 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1801** (AAU, HN!, LE!, MO); id., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Epiphyte, common. 29 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1859** (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte and lithophyte, very common. 12 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3591** (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte, very common. 1 V 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1982** (AAU, HN!, LE!, MO).

52.160. *Ph. recurva* (Lindl.) Rchb. f.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Quoc Toan mun., Trang Hen lake, 22°45'N 106°18'E, 825 m, degraded forest on rocky outcrops at summit. Thickened stems green-brown, pendulous, leaves and petioles green, rare. 7 IV 1998, D.K.Harder, P.K.Loc, T.T.Tai, **DH 4348** (HN!, MO).

52.161. *Ph. roseans* Schlechter

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophytic herb on vertical cliffs, flowers white, anther yellowish-green, very common. 15 XI 1998, L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, **CBL 314** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., An Lac mun., vicin. of Phia Deng village, 22°43'N 106°36'E, 600 m, about 36 km to E from Cao Bang town, primary open coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophytic herb on steep cliffs, very common, often abundant. 29 XI 1998, L.Averyanov, P.K.Loc, **CBL 783** (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, 700 m, about 43 km to E from Cao Bang town, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Lithophytic herb on vertical shady cliffs, very common. 26 XI 1998, L.Averyanov, P.K.Loc, N.X.Tam, **CBL 678** (AAU, HN!, LE!, MO); id., **Thach An** distr., Thuy Hung mun., vicin. of Na Lit village, 22°30'N 106°27'E, 500–550 m, about 27 km to SE from Cao Bang town, secondary semideciduous open forest and shrubs along tops of remnant limestone ridge. Lithophytic herb on open vertical cliffs, very common. 4 XII 1998, L.Averyanov, N.Q.Binh, P.K.Loc, N.X.Tam, **CBL 887** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 800–850 m, about 21 km from Cao Bang town to the N, open secondary broad-leaved forest with bamboo along

tops of remnant limestone ridge. Lithophyte on vertical shady cliffs, flowers white, common. 9 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 1011** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Lithophyte on shady vertical cliffs, flowers white, very common. 10 XII 1998, *L.Averyanov*, *N.Q.Binh*, *N.T.Hiep*, *N.X.Tam*, **CBL 1064** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic herb on vertical cliffs, very common. 29 IV 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1858** (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus*, *Taxus*, *Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte and lithophyte on mossy rocks and cliffs, abundant. 12 X 1999, *N.T.Hiep*, *N.Q.Binh*, *L.Averyanov*, *P.Cribb*, **NTH 3571** (HN!, K, LE!). **N.Vietnam, Lang Son** prov., Huu Lien mun., Huu Lien protected area, 21°40'N 106°23'E, 510 m, degraded forest with bamboo on well eroded quartz hills on upper slopes, on rocks. Pseudobulbs green, fruit light green, rare. 4 IV 1998, *D.K.Harder*, *P.K.Loc*, *N.T.Hiep*, *N.Q.Binh*, **DKH 4188** (HN!, MO).

52.162. *Ph. yunnanensis Rolfe

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Ca Thanh mun., about 3 km to SW from Yen Lac village, 22°44'N 105°50'E, 1400–1450 m, about 42 km to NWW from Cao Bang town, primary open coniferous mossy forest with *Pseudotsuga brevifolia* in 1 stratum along tops of limestone karst remnant ridge. Epiphyte and lithophyte, abundant. 18 XI 1998, *L.Averyanov*, *P.K.Loc*, *N.X.Tam*, **CBL 403** (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophytic creeping herb, very common. 15 XI 1998, *L.Averyanov*, *N.T.Hiep*, *P.K.Loc*, *N.X.Tam*, **CBL 326** (AAU, HN!, LE!, MO); id., **Thach An** distr., Van Trinh mun., 22°21'N 106°27'E, 600 m, about 39 km to SSE from Cao Bang town, secondary open semideciduous broad-leaved forest on tops of remnant limestone ridge. Lithophytic herb on open rocks, not common. 3 XII 1998, *L.Averyanov*, *N.Q.Binh*, *P.K.Loc*, *N.X.Tam*, **CBL 842** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Lithophytic creeping herb on open mossy rock outcrops, tepals and lip white, column white, anther reddish-orange, abundant. 1 V 1999, *P.K.Loc*, *P.H.Hoang*, *L.Averyanov*, **CBL 1990** (AAU, HN!, LE!, MO).

53. *Platanthera* Rich.**53.163. *P. angustata* (Blume) Lindl.**

Cao Bang prov., **Nguyen Binh** distr., Nguyen Binh mun., 22°37'N 105°52'E, 1400–1900 m, about 41 km to W from Cao Bang town, elevation from Le A pass to Na Ni mt. peak, old secondary closed evergreen wet mountain forest. Terrestrial herb on wet shady steep slopes, old leaves often with irregular whitish tessellation, not rare. 11–12 XI 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 138* (AAU, HN!, LE!, MO).

54. *Pleione* D. Don**54.164. *P. vietnamensis* P. Cribb et Aver.**

N.Vietnam, Ha Giang prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, primary very wet mossy cloud mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte at the base of mossy old tree stem on vertical cliff of N exposition near ridge top, very rare. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1876* (AAU, HN!, LE!, MO).

55. *Podochilus* Blume**55.165. *P. microphyllus* Lindl.**

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Lithophytic herb on shady cliffs of N exposition, common. 19 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3676* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, 700 m, about 43 km to E from Cao Bang town, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Lithophyte on shady vertical cliffs, common. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 684* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Lithophyte on shady vertical cliffs, not rare. 13 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1190* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., Sung Chang mun., vicin. of Lu Lu Phin village, 23°11'N 105°18'E, 1350–1400 m, primary mixed mossy semideciduous open forest with domination of *Pseudotsuga brevifolia* and *Tsuga chinensis* along tops of karst remnant limestone ridge. Lithophytic herb on shady vertical cliffs, common. 29 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1863* (AAU, HN!, LE!, MO); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte and lithophyte

in shady places, abundant. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3569* (HN!, K, LE!). **N.Vietnam, Vinh Phuc** prov., **Tam Dao** distr., vicin. of Tam Dao town, 21°27'N 105°39'E, 950–1000 m, Tam Dao ridge, primary very wet evergreen broad-leaved forest on vertical riolite cliff of NE exposition. Lithophytic herb on shady wet rock outcrops, common. 10 XI 1998, *N.T.Hiep, L.Averyanov, sine no* (HN!, LE!).

56. *Porpax* Lindl.

56.166. **P. lanii* Seidenf.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Nam Linh mt., 22°47'N 105°49'E, 1550–1600 m, old secondary broad-leaved wet mossy cloud forest along tops of remnant karst limestone Nam Linh ridge. Epiphyte in open vertical cliffs, rare. 15 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1428a* (LE!); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Lithophyte, rare. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 321* (HN!, LE!). **N.Vietnam, Ha Giang** prov., **Yen Minh** distr., Lao Va Chai mun., vicin. of Ngan Chai village, 6 km to W of Yen Minh town, 23°7'N 105°8'E, 1500–1600 m, primary evergreen wet mossy mixed forest with domination of *Tsuga chinensis* and *Pinus kwangtungensis* along tops of karst remnant limestone ridge. Epiphyte on mossy stem of old *Pinus* tree, flowers purple-brown, hardly opening, not smelled, rare. 1 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1981* (HN!, LE!).

57. *Renanthera* Lour.

57.167. *R. coccinea* Lour.

N.Vietnam, Thai Nguyen prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 250–300 m, 23.3 km to 18° of Thai Nguyen town, secondary dry evergreen broad-leaved forest with bamboo on tops of remnant karst limestone ridge. Lithophytic woody vine up to 4 m lg on open rocks, very common. 22 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3771* (HN!, K, LE!).

58. *Rhomboda* Lindl.

58.168. *Rh. petelotii* (Gagnep.) Ormerod

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1500 m, about 44 km to NWW from Cao Bang town, primary open coniferous mossy forest along tops of limestone remnant karst ridge. Terrestrial and lithophytic herb in shady rock crevices along wet canyons, leaves deep brownish-green with central white stripe, not rare. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 312* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 650–800 m, about 21 km from Cao Bang town to the N, primary evergreen closed wet forest on steep slopes and bluffs of remnant limestone ridge. Lithophytic and terrestrial herb on shady cliffs, leaves velvety deep green with

central silver stripe, not common. 9 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 983* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Meo Vac** distr., vicin. of Meo Vac town, 23°10'N 105°24'E, 1300–1400 m, 48.2 km to 36° of Ha Giang town, primary evergreen broad-leaved wet closed forest on sandstones. Creeping terrestrial herb on shady steep slope, leaves green with white longitudinal median stripe, rare. 7 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3442* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Terrestrial creeping herb in shady places, leaves velvety pale green with median whitish stripe, rare. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3603* (HN!, K, LE!); id., **Yen Minh** distr., Lao Va Chai mun., vicin. of Lao Va Chai village, 23°7'N 105°8'E, 1200–1300 m, 35.9 km to 27° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep slope of karst remnant limestone ridge. Terrestrial herb on shady places, leaves velvety green with median longitudinal silver stripe, rare. 9 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3459* (HN!, K, LE!).

59. *Robiquetia* Gaudich.

59.169. *R. succisa* (Lindl.) Seidenf. et Garay

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, Dong Con village. Epiphyte, 35–40 cm, flowers pale yellow. 8 VIII 1999, *N.M.Cuong, M.V.Sinh, H.L.Quyen, NMC 401* (HN!).

60. *Sarcoglyphis* Garay

60.170. **S. smithianus* (A.F.G. Kerr) Seidenf.

N.Vietnam, Lao Cai prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1100 m, remnants of primary broad-leaved evergreen wet forest on quartzites along Mit Noi river between Ho Mit and Ban Thao villages (SSW macroslope of Hoang Lien Son ridge). Epiphyte on mossy tree along open stream rocks, rare. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2700* (HN!, LE!).

61. *Spiranthes* Rich.

61.171. *S. sinensis* (Pers.) Ames.

N.Vietnam, Bac Can prov., Ngan Son distr., Wind Pass on road Hanoi - Cao Bang, 22°25'N 105°55'E, 700 m. Terrestrial herb on wet clay-lateritic soil on shales among limestone rocks in open secondary shrubs and short tall grasslands, flowers white with pink tint toward sepal tips, sweet fragrant, common. 11 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1258* (AAU, HN!, LE!, MO). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1050–1100 m, secondary open broad-leaved forest on alluvial foothills of remnant karst limestone ridges. Terrestrial herb on wet open short tall grasslands, flowers pink, common. 13 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1373* (AAU, HN!,

LE!, MO); id., **Nguyen Binh** distr., Nguyen Binh mun., 22°37'N 105°52'E, 1400–1900 m, about 41 km to W from Cao Bang town, elevation from Le A pass to Na Ni mt. peak, old secondary closed evergreen wet mountain forest. Herb up to 20 cm hg on open steep wet slope, flowers light pink, rare. 11–12 XI 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 131* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Ho Quang Phin mun., vicin. of Ta Xa village, 14–16 km to SSW of Dong Van town, 23°16'N 105°22'E, 1300–1350 m, secondary shrubs and short tall grasslands along edge of broad-leaved wet forest on steep slopes of karst remnant limestone ridge. Terrestrial herb in open places among limestone rocks, flowers pinkish-white, not common. 28 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1772* (AAU, HN!, LE!, MO).

62. *Stereosandra Blume

62.172. *S. javanica Blume

N.Vietnam, Ha Tinh prov., **Huong Son** distr., Rao An – Ngam Thiep village, 18°22'N 105°13'E, 197–500 m, eastern slope, along stream. Herb 20–30 cm tall, corolla white. 19 IV 1998, *N.T.Hiep, N.K.Dao, T.P.Anh, VA 201* (HN!, MO).

63. Thelasy Blume

63.173. Th. pygmaea (Griff.) Blume

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, about 50 km to E from Cao Bang town, 650–700 m, open primary mixed mossy semideciduous and coniferous forest along tops of limestone ridge. Epiphyte, not common. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 643* (AAU, HN!, LE!, MO); id., **Thach An** distr., Duc Xuan mun., 22°21'N 106°27'E, 550 m, about 39 km to SSE from Cao Bang town, primary broad-leaved semideciduous forest along tops of remnant limestone ridge. Epiphyte, common. 2 XII 1998, *L.Averyanov, P.K.Loc, CBL 802* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Epiphyte on mossy trees, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3514* (HN!, K, LE!); id., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 1100–1150 m, 26.2 km to 2° of Ha Giang town, primary closed evergreen mixed wet mossy forest with *Cupressus, Taxus, Nagea* and *Pseudotsuga* along tops of karst remnant limestone ridge. Epiphyte on mossy trees, common. 12 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3578* (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Son Kim mun., Huong Son forest enterprise, along Rao Anh river, 18°25'N 105°13'E, 200–220 m, primary forest. Epiphyte in trees along stream, pseudobulbs light green to yellow, flowers green to orange-yellow when old, occasional. 13 VI 1999, *D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, 4383/HS-242* (HN, LE!, MO).

64. *Thrixspermum* Lour.64.174. *Th. calceolus* Rchb. f.

N.Vietnam, Cao Bang prov., **Tra Linh** distr., Co Muoi mun., vicin. of Lung Dat village, 22°51'N 106°14'E, 900–1000 m, about 22 km from Cao Bang town to the N, primary mixed semideciduous forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, not common. 12 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1137* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic and epiphytic shrub up to 1 m hg, not rare. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3522* (HN!, K, LE!).

64.175. *Th. centipeda* Lour.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thang Loi mun., vicin. of Lung Sam village, 22°45'N 106°42'E, 500–550 m, secondary wet evergreen broad-leaved forest with remnants of primary elements on steep slopes and bluffs of karst remnant limestone ridge. Epiphytic and lithophytic herb with pendant shoots up to 0.4 m lg, common. 23 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1668* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Epiphyte on high tree, rare. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 943* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Nga Doi, 18°30'N 105°14'E, 200–250 m, primary and secondary forest on schist. Epiphyte. 20 V 1998, *N.T.Hiep, P.K.Loc, N.Q.Binh, L.Xiem, VA 779* (HN!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Bong village, 500 m. Epiphyte, 20–30 cm, flowers pale yellow, lip white. 31 VII 1999, *N.M.Cuong, H.L.Quyen, NMC 329* (HN!).

65. **Thunia* Rchb.f.65.176. **Th. alba* (Lindl.) Rchb.f.

N.Vietnam, Lai Chau prov., **Sin Ho** distr., Ta Ngau mun., about 30 km of Lai Chau town to the N, 22°18'N 103°15'E, 1600 m, secondary open wet mossy evergreen broad-leaved forest with remnants of primary elements on rocky foothills of remnant karst limestone ridge. Lithophytic herb up to 1 m hg on open mossy limestone rock outcrops, flowers odorless, white, lip with yellow center and purple veins on side lobes, locally common. 25 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2749* (HN!, LE!).

66. *Trichotosia* Blume66.177. *T. dasphylla* (Par. et Rchb. f.) Kraenzl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Duc Quang mun., vicin. of Lung Hoai village, 22°43'N 106°40'E, 600–650 m, about 43 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest with *Pinus kwangtungensis*

and *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Creeping epiphyte on high trees, flowers yellow, lip with purple-brownish marks, not common. 28 XI 1998, *L.Averyanov, P.K.Loc, CBL 763* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte, flowers yellow, lip with brown-purple marks, not common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 745* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte, flowers yellow, lip with brown-purple marks, not common. 13 XII 1998, *N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, CBL 1210* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°48'N 106°17'E, 600 m, about 16 km from Cao Bang town to the N, remnants of primary evergreen broad-leaved forest on alluvial valley between remnant limestone ridges. Epiphyte on high trees, flowers yellow, lip with purple-brown spots, sporadically abundant. 11 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1089* (AAU, HN!, LE!, MO). **N.Vietnam, Lao Cai** prov., **Than Uyen** distr., Ho Mit mun., 22°6'N 103°52'E, 1500–1600 m, elevation to Mang Han San quartzite peak by SW slope from Ban Thao village (SSW macroslope of Hoang Lien Son ridge), primary wet evergreen broad-leaved forest on very steep rocky slope. Small creeping epiphytic vine on high trees, flowers yellow, not common. 21–22 V 1999, *N.T.Hiep, P.H.Hoang, L.Averyanov, NTH 2804* (HN!, LE!).

66.178. *T. velutina* (Lodd. ex Lindl.) Kraenzl.

N.Vietnam, Cao Bang prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphyte in shady places on slope of N exposition, not rare. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 736* (AAU, HN!, LE!, MO). **N.Vietnam, Cao Bang** prov., **Tra Linh** distr., Luu Ngoc mun., vicin. of Lung Mu village, 22°47'N 106°18'E, 800 m, about 14 km from Cao Bang town to the N, primary coniferous and mixed semideciduous open forest with *Pseudotsuga brevifolia* along tops of limestone ridge. Epiphyte on shady places, flowers whitish, not common. 13 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 1187* (AAU, HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Epiphyte 17 IX 1999, *N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, NTH 3075* (HN!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Epiphyte, not common. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3814* (HN!, K, LE!).

67. *Tropidia* Lindl.

67.179. *T. angulosa* (Lindl.) Blume

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Dinh Phung mun., Man Lung

ridge, 22°47'N 105°49'E, 1550–1600 m, primary very wet cloud evergreen closed mixed forest with *Podocarpus* and *Fokienia* along tops of remnant karst limestone Man Lung ridge. Terrestrial and lithophytic herb up to 0.5 m hg, not common. 18 IV 1999, P.K.Loc, P.H.Hoang, L.Averyanov, **CBL 1547** (AAU, HN!, LE!, MO). **N.Vietnam, Ninh Binh** prov., **Nho Quan** distr., Cuc Phuong national park, Dan village, 9 km to Bong Fray Head Quarters, forest dominated by *Streblus macrophyllus*. Herb to 50 cm tall, flower white, peduncles green, sepals, bracts and fruits green. 20 VI 1999, M.A.Jaramillo, R.Callejas, N.T.Hiep, N.M.Cuong, **MAJ 525** (HN!); id., **Nho Quan** distr., Cuc Phuong national park, from Bong village to May Bac peak. Terrestrial herbs, to 5–10 cm tall. 17 IX 1999, N.T.Hiep, N.X.Tam, N.M.Cuong, M.V.Sinh, **NTH 3078** (HN!).

67.180. *T. curculigoides* Lindl.

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1200 m, about 44 km to NWW from Cao Bang town, primary evergreen closed broad-leaved forest on steep mt slopes of limestone ridge. Herb up to 0.5 m hg on steep shady slope, not rare. 15 XI 1998, L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, **CBL 307** (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quoc Toan mun., vicin. of Lung Tao village, 22°45'N 106°19'E, 600–800 m, about 12 km from Cao Bang town to the NNE, primary semideciduous open broad-leaved forest on steep slopes and bluffs of remnant limestone ridge. Terrestrial herb up to 0.6 m hg on steep shady slopes, not common. 14 XII 1998, N.T.Hiep, N.Q.Binh, P.K.Loc, N.X.Tam, L.Averyanov, **CBL 1251** (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Quan Ba** distr., Can Ti mun., vicin. of Sing Xuoi Ho village, 23°4'N 104°59'E, 800–1000 m, 26.2 km to 2° of Ha Giang town, primary wet evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Terrestrial herb up to 1 m hg, not rare. 12 X 1999, N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, **NTH 3564** (HN!, K, LE!). **N.Vietnam, Ha Tinh** prov., **Huong Son** distr., Son Kim mun., in Huong Son forest enterprise, along Rao Anh river, 18°25'N 05°13'E, 200–220 m, primary forest, widespread under shade. Flower bracts white. 13 VI 1999, D.K.Harder, N.T.Hiep, L.V.Averyanov, R.Callejas, M.A.Jaramillo, **4381/HS-240** (HN!, LE!, MO); id., **Huong Son** distr., Rao An – Ngam Thep village, 18°22'N 105°13'E, 197 m, broad-leaved evergreen forest, in wet valley. Herb up to 0.5 m tall on ground, tepals, sepals green, petals white-green. 15 IV 1998, N.T.Hiep, N.K.Dao, T.P.Anh, **VA 108** (HN!, MO).

68. *Vanda* W. Jones ex R. Br.

68.181. *V. fuscoviridis* Lindl.

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'E 106°3'N, 800 m, 27 km to 55° of Bac Can town, remnants of primary mixed evergreen dry open forest with *Pseudotsuga brevifolia* and bamboo along tops of remnant karst limestone ridge. Epiphyte, not rare. 19 X 1999, N.T.Hiep, P.K.Loc, L.Averyanov, **NTH 3666** (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1100 m, about 44 km to NWW from Cao Bang town, primary broad-leaved forest remnants along stream

on alluvial valley among limestone ridges. Epiphyte, not rare. 18 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 505* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Dong Loan mun., vicin. of Ban Lung and Lung Phuc, 22°46'N 106°44'E, 500–600 m, about 50 km to E from Cao Bang town, open primary evergreen broad-leaved closed forest on steep slopes and cliffs of limestone ridge. Epiphyte, rare. 25 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 621* (AAU, HN!, LE!, MO); id., **Ha Lang** distr., Thang Loi mun., vicin. of Ban Hao, 22°43'N 106°40'E, 700 m, about 43 km to E from Cao Bang town, secondary evergreen broad-leaved closed forest on steep slopes near the tops of remnant limestone ridges. Epiphyte, not rare on slopes and on tops of ridge, 500–700 m. 26 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 687* (AAU, HN!, LE!, MO). **N.Vietnam, Cao Bang** prov., **Ha Lang** distr., Thanh Nhat mun., 22°41'N 106°40'E, 600 m, about 42 km to E from Cao Bang town, primary open coniferous and mixed semideciduous forest along tops of remnant limestone ridge. Epiphytic shrub with pendant or erect shoots up to 0.5 m lg, common. 27 XI 1998, *L.Averyanov, P.K.Loc, N.X.Tam, CBL 709* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 25 km to SSE from Cao Bang town, 22°27'N 106°22'E, 500 m, primary evergreen closed semideciduous forest on tops of remnant limestone ridge. Epiphyte, common. 5 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 927* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Epiphytic and lithophytic shrub with pendant shoots up to 1 m lg, common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 954* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 800–850 m, about 21 km from Cao Bang town to the N, open secondary broad-leaved forest with bamboo along tops of remnant limestone ridge. Lithophyte and epiphyte, not rare. 9 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1013* (AAU, HN!, LE!, MO); id., **Tra Linh** distr., Quang Vinh mun., 22°51'N 106°14'E, 850–900 m, about 21 km from Cao Bang town to the N, open primary coniferous forest with *Pseudotsuga brevifolia* along tops of remnant limestone ridge. Epiphyte and lithophyte, common. 10 XII 1998, *L.Averyanov, N.Q.Binh, N.T.Hiep, N.X.Tam, CBL 1057* (AAU, HN!, LE!, MO). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Dong Van mun., vicin. of Dong Van town, 23°16'N 105°22'E, 1100 m, secondary shrubs on steep slopes and bluffs of karst remnant limestone ridges. Lithophytic shrublet 0.3–0.6 m hg on open rocks, common. 27 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1707* (AAU, HN!, LE!, MO); id., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic shrub up to 0.5 m hg, very common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3524* (HN!, K, LE!).

68.182. *V. concolor* Blume (= *V. guanxiensis* Fowl.)

N.Vietnam, Cao Bang prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1050–1100 m, secondary open broad-leaved forest on alluvial foothills of remnant karst limestone ridges. Epiphyte on old tree, flowers odorless, tepals brown with yellow longitudinal stripes, lip – epichile brown with longitudinal

yellow stripes, gypochile side lobes light yellowish with numerous small purple marks and yellow center, column and anther yellowish-white, not common. 14 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1349* (LE!); id., **Tra Linh** distr., Quoc Toan mun., Trang Hen lake, disturbed forest on upper slope of solid limestone rock, between 22°45'N, 106°18'E, 666 m and 22°46'N, 106°17'E, 831 m. Epiphyte, leaves speckled purple at point of attachment, floral tube yellow, tepals speckled orange, yellow, red, rostellum-labellum dull yellow, pollinia bright yellow, rare. 6 IV 1998, *D.K.Harder, P.K.Loc, T.T.Tai, DH 4277* (HN!, MO).

69. *Vandopsis* Pfitz.

69.183. *V. gigantea* (Lindl.) Pfitz.

N.Vietnam, Bac Can prov., Ngan Son distr., Wind Pass on road Hanoi – Cao Bang, 22°25'N 105°55'E, 700 m. Large epiphyte or lithophyte, flowers yellowish with purple tint outside tepals, lip yellowish, tepals with circular dull pink-brown spots, later flowers dull yellow, not smelled, collected from plants offered for sale by local dealers along road, not rare. 11 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1261* (LE!). **N.Vietnam, Ha Giang** prov., **Dong Van** distr., Tu Tinh mun., 23°5'N 105°15'E, 600–750 m, 40.7 km to 43° of Ha Giang town, remnants of dry broad-leaved evergreen forest on steep slopes and cliffs near the top of karst limestone isolated mesa. Lithophytic shrub with pendant shoots up to 2 m long, not common. 10 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3527* (HN!, LE!). **N.Vietnam, Thai Nguyen** prov., **Vo Nhai** distr., Than Sa mun., vicin. of Kim Son village, 21°48'N 105°54'E, 450–550 m, 23.3 km to 18° of Thai Nguyen town, primary broad-leaved evergreen dry forest along tops of karst remnant limestone ridge. Lithophytic shrub with pendant shoots up to 2 m lg, rare. 23 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3816* (HN!, LE!).

70. *Vanilla* Mill.

70.184. *V. albida* Blume

N.Vietnam, Bac Can prov., **Na Ri** distr., Kim Hy mun., vicin. of Lung Hin Con village, 22°17'N 106°3'E, 550–600 m, 27 km to 55° of Bac Can town, primary evergreen broad-leaved closed forest on very steep rocky slope of karst remnant limestone ridge. Herb creeping epiphytic vine up to 10 m lg, rare. 20 X 1999, *N.T.Hiep, P.K.Loc, L.Averyanov, NTH 3711* (HN!, K, LE!). **N.Vietnam, Cao Bang** prov., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1300 m, about 44 km to NWW from Cao Bang town, primary evergreen closed broad-leaved forest on steep mt slopes of limestone ridge. Herb creeping epiphytic vine 8–10 m lg, rare. 15 XI 1998, *L.Averyanov, N.T.Hiep, P.K.Loc, N.X.Tam, CBL 306* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1200–1300 m, primary semideciduous broad-leaved forest on steep slopes and bluffs of S exposition near the tops of remnant karst limestone ridge. Herb vine up to 10 m lg, rare. 16 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1481* (AAU, HN!, LE!, MO); id., **Bao Lac** distr., Yen Lac mun., vicin. of Yen Lac village, 22°44'N 105°50'E, 1300 m, primary open broad-leaved semideciduous forest on vertical cliffs of karst remnant limestone ridge of N exposition. Creeping lithophytic vine up to 6–8 m lg, not

common. 20 IV 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 1585* (AAU, HN!, LE!, MO); id., **Thach An** distr., about 28 km to SE from Cao Bang town, 22°29'N 106°28'E, 300–450 m, primary evergreen broad-leaved closed forest on steep slopes of remnant limestone ridge. Creeping epiphytic vine about 10–12 m lg, not common. 6 XII 1998, *L.Averyanov, N.Q.Binh, N.X.Tam, CBL 961* (AAU, HN!, LE!, MO). **N.Vietnam, Lang Son** prov., Huu Lien mun., Huu Lien protected area, 21°40'N 106°23'E, 510 m, degraded forest on well eroded quartz hills slopes, among bamboo and in low trees. Stem and leaves green, bracts pale green, pedicels pale yellow-green, outer petals pale yellow-green, upper petals pale orange and yellow, interior streaked in orange, lower lip deep green at tip, with pale yellow processes, white stigmatic surface at rostellum, locally abundant. 4 IV 1998, *D.K.Harder, P.K.Loc, N.T.Hiep, N.Q.Binh, DKH 4186* (HN!, LE!, MO); id., **Huu Lung** distr., Huu Lien mun., 21°40'N 106°22'E, 350 m, primary evergreen broad-leaved wet forest on steep slopes of remnant karst limestone ridge. Epiphytic creeping vine up to 8 m long, not common. 1 X 1999, *N.T.Hiep, N.Q.Binh, L.Averyanov, P.Cribb, NTH 3257* (HN!, K, LE!).

71. *Yuania Maxim.

71.185. *Y. prainii King et Pantl.

N.Vietnam, Ha Giang prov., **Yen Minh** distr., Du Gia mun., E slopes of Phu Tha Ca mountain system, 23°56'N 105°13'E, 1300–1500 m, primary evergreen broad-leaved very wet mountain forest on shale very steep slopes. Chlorophyllless saprophyte with erect white stems up to 20 cm hg in shady steep rocky shale-quartzite slopes, flowers odorless, sepals white, with violet tint, petals white, lip with deep-purple marks inside along median part, side lobes white, with deep-purple numerous spots, outside lip white, column white, anther light yellowish, ovary white with violet tint, not rare. 3 V 1999, *P.K.Loc, P.H.Hoang, L.Averyanov, CBL 2091* (HN!, LE!).

72. Zeuxine Lindl.

72.186. Z. vietnamica Aver.

N.Vietnam, Ninh Binh prov., **Nho Quan** distr., Cuc Phuong national park, limestone massif, 100–400 m. Terrestrial creeping herb in shady places, leaves velvety black-green, not common. 1999, *N.T.Hiep, NTH 3891* (HN!).

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SUMMARY

New localities of 186 orchid species (from 73 genera) collected in the territory of Vietnam during field works of expeditions 1998–1999 years are reported. Data about some interesting samples that were found in Herbaria and private collections of Vietnam and Russia are also presented in the paper. Four genera (*Bletilla*, *Stereosandra*, *Thunia*, *Yuania*) and 29 species (*Bletilla ochracea*, *Bulbophyllum macraei*, *B. modestum*, *B. parviflorum*, *B. schweliense*, *B. striatitopalum*, *Chiloschista trudelii*, *Calanthe mannii*, *Coelogyne malipoensis*, *Coelogyne schultesii*, *Cryptochilus lutea*, *Cymbidium erythraeum*, *C. lowianum*, *Eria carinata*, *Goodyera viridiflora*, *Holcoglossum wangii*, *Nervilia punctata*, *Panisea yunnanensis*, *Paphiopedilum dianthum*, *P. henryanum*, *P. micranthum*, *Phaius longicruris*, *Pholidota missionariorum*, *Ph. yunnanensis*, *Porpax lanii*, *Sarcoglyphis smithianus*, *Stereosandra javanica*, *Thunia alba*, *Yuania prainii*) are discovered for the country at first.