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The rediscovery of *Platambus* (s.str.) *angulicollis* (Régimbart, 1899), and a discussion of some characters for the phylogenetic evaluation of the genus *Platambus* Thomson, 1859 (Coleoptera, Dytiscidae)

by **Lars Hendrich & Michel Brancucci**

Abstract. *Platambus* (s.str.) *angulicollis* (Régimbart, 1899) from China is rediscovered, and its status is discussed. The known distribution and ecology of the species are briefly outlined. Several characters that are generally used and accepted as reliable for phylogenetic analysis are discussed.

Key words. Coleoptera – Dytiscidae – *Platambus angulicollis* – China – systematics – new records

Introduction

The dytiscid genus *Platambus* Thomson, 1859 of the tribe Agabini contains 61 rheophilic species that are restricted to the Nearctic, Palaearctic and Oriental realms (Brancucci 1988, Wewalka & Brancucci 1995, Nilsson 2001); 21 described species are currently recorded from China (Nilsson 2003, Brancucci 2005). One of the largest species of the genus, *Platambus angulicollis* (Régimbart, 1899), was described at the end of 19th century, based on several specimens collected in Tà-tsien-loù (= Kanding, 30.03N - 102.02E) in the western part of the Chinese province of Sichuan, at the foot of the Tibet Range. It has not been collected since the original description (Brancucci 1988). Régimbart's original three specimens are deposited in the collection of the Paris Museum (MHNP) and have previously been designated as lectotype and paralectotypes (Brancucci 1988).

In the last 10 years, extensive collections have been made in China by various Chinese and European collectors, and a few specimens of this species were caught by our colleagues Jaroslav Šťastný (Liberec) and David Wrase (Berlin) in the provinces of Sichuan and Yunnan. Additional material has been obtained from museum collections (e.g. "China Water Beetle Survey (CWBS)" (Jäch & Ji 1998).

The aim of this paper is to discuss the systematic status of *P. angulicollis* within the genus *Platambus*, and in addition the distribution and ecology of the species will be briefly outlined.

Abbreviations for depositories

CGW ..... Collection Prof. Dr. Günther Wewalka, Vienna, Austria
CJS ..... Collection Jaroslav Šťastný, Liberec, Czech Republic
CLH ..... Collection Dr. Lars Hendrich, Berlin, Germany
NMB ..... Naturhistorisches Museum Basel, Switzerland
NMPC ..... Národní Muzeum Praha (Prague), Czech Republic
NMW ..... Naturhistorisches Museum Wien (Vienna), Austria

Platambus angulicollis (Régimbart, 1899) Figs 1–4

Agabus angulicollis Régimbart, 1899: *Ann. Soc. Ent. Fr.* **68:** 273.

Agabus (*Gaurodytes*) *angulicollis*: ZIMMERMANN (1920): *Coleopt. Cat.* **4(71):** 156. – ZIMMERMANN (1934): *Koleopt. Rdsch.* **20:** 161. – FENG (1932): *Peking nat. Hist. Bull.* **7:** 27. – FENG (1936): *Peking nat. Hist. Bull.* **11:** 8. – WU (1937): Catalogus insectorum sinensium, p. 12. – ZENG (1989): Abstract of Ph.D Thesis, p. 6.

Agabus (*Stictogabus*) *angulicollis*: GUIGNOT (1948): *Bull. mens. Soc. Linn. Lyon* **17(9):** 167. – GSCHWENDTNER (1923): *Arch. Naturg.* **A 89(8):** 110.

Gaurodytes (*Anagabus*) *angulicollis*: ZIMMERMANN (1934): *Koleopt. Rdsch.* **20:** 161. – ZAITSEV (1953): *Fauna SSSR* **58(4):** 264.

Stictogabus angulicollis: GUÉORGUIEV (1968): *Bull. Inst. Zool. Mus.* **28:** 42.

Platambus angulicollis: BRANCUCCI (1982): *Mitt. Schweiz. Ent. Ges.* **55:** 115. – BRANCUCCI (1988): *Entomologica Basiliensia* **12:** 209. – NILSSON (1995): Water Beetles of China, Vol. 1, p. 57. – NILSSON (2001): *World Cat. Insect* **3:** 38.

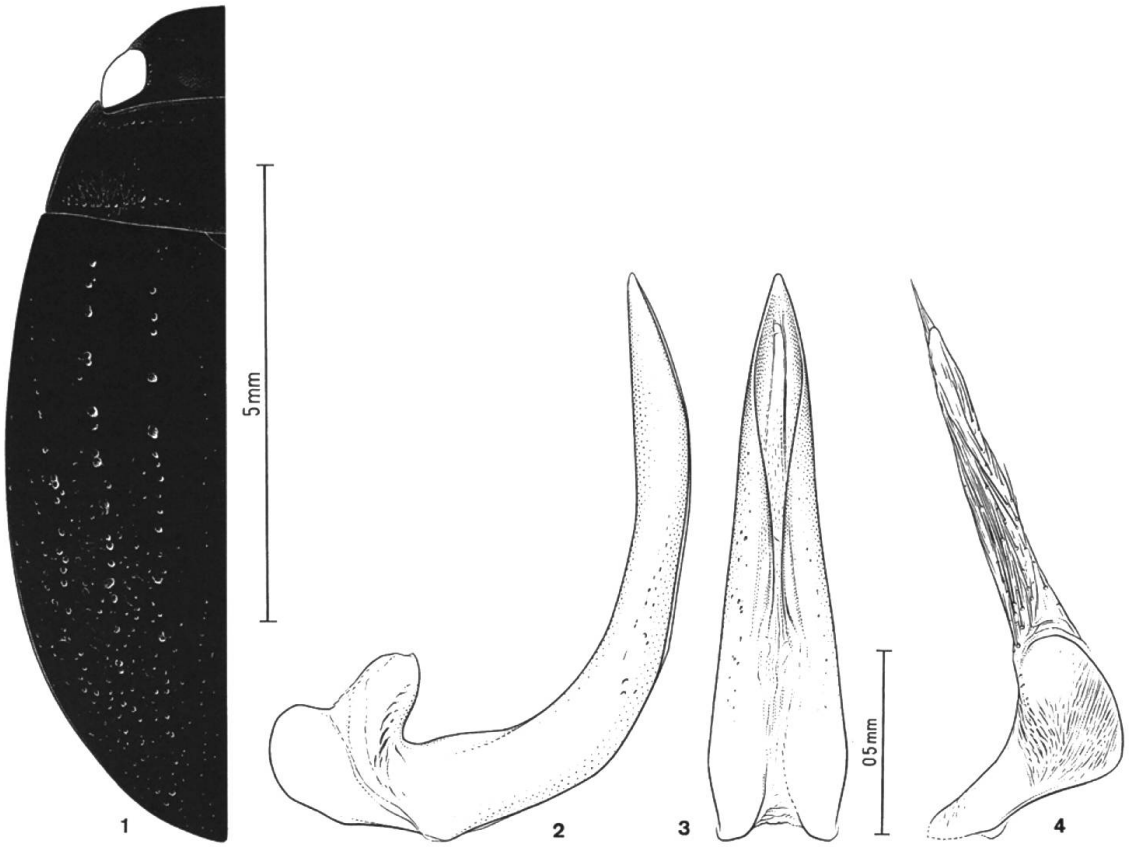
Material studied. 6 ex.: China, Gansu Prov., Lazikou valley, 2150 m, 34°08.0'N, 103°54.5'E (GPS), 27.VI.2005, captured in lateral branch of mountain stream, J. Hájek, D. Král & J. Růžička leg.; 3 ex.: China, Sichuan Prov., 53 km NW Lixian, 2750 – 3000 m, VII.2001, S. Murzin leg.; coll. Hájek (NMPC); 11 ex.: China, Sichuan Province, Yaan City Region; 2 km NE Baoxing City, branch of Donghe Jiang, 1000 m, 10.VI.1996, leg. Ji & Wang (CWBS loc. 227) (7 ex. in NMW, 4 ex. in CGW); 1 ex.: China, Sichuan Province, Yaan City Region, Tiangüan County, c. 57 Km W Yaan City, 4 km W Xingou village, at foot of Erlang Shan, stream, 1500 m, 12.VI.1996, leg. Ji & Wang (CWBS loc. 232) (NMW); 1 ex.: China, Sichuan Province, Yaan City Region, Tiangüan County, c. 57 Km W Yaan City, 6 km SW Zishi village, Tianqüan He, ca. 6–8 m wide, cold and fast flowing stream, with gravel and cobbles, slightly polluted, 1500 m, 12.VI.1996, leg. Ji & Wang (CWBS loc. 231) (CGW); 1 ex.: "China/Central Sichuan, Volong 150 NY Chengdu, 9.–10.7.94, Beneš leg., Coll. Hendrich" (CLH); 5 ex.: "China, W. Sichuan, Ya'an Pref. Baoxing Co., Jiajin Shan, riv. vall. 3 km S Quiaoqi, 78 km NN W Ya'an, 30°40' N, 102°45'E, 1950 m. riv. bank, 11.VII.1999, D.W. Wrase" (4 ex., CLH and 1 ex., NMB); 3 ex: "China, Sichuan prov., Quingchenhou Mts., 70 km W Chengdu, 1500 m, 15.–18.VII.2004, S. Murzin leg." (CLH, CJS); 2 ex: "China, Yünnan prov.; ca. 4000m a.s.l., 32km SE ZHONGDIAN; 99o52´/27o48´, flat valley; stony river ca. 15m wide, 11.–12.10.1999, leg. J. Šťastný" (CJS) (Fig. 6); 2 ex: "China, Yünnan prov.; ca. 2700m a.s.l., E ZHONGDIAN; ca.100o12´/27o47´, stony river ca.10m wide in steep valley, 18.10.1999, leg. J. Šťastný" (CJS) (Fig. 7); 1 ex: "China, Yünnan prov.; ca. 3500m a.s.l., E ZHONGDIAN; ca.100o10´/27o48´, shallow stream 1m wide, gravel, 14.10.1999, leg. J. Šťastný" (CJS).

Measurements. TL = 8.90–9.50 mm (9.18 mm, n = 5), TL-h = 8.10–8.50 mm (8.28 mm), TW = 4.70–5.00 mm (4.88 mm).

Differential diagnosis. Because of its size, *P. angulicollis* (Régimbart, 1899) is easily distinguishable from all other species of the genus. As discussed below, it is most closely related to *P. nepalensis* (Guéorguiev, 1968), from Nepal, Sikkim and Bhutan, and to *P. satoi* Brancucci, 1982, from Nepal, but can be easily distinguished by its larger size (Fig. 1) and by the aedeagus (Figs 2 and 3) and parameres (Fig. 4).

Distribution. China, in the mountains of Sichuan, Yunnan and Tibet. The records from Mongolia and the Chinese provinces of Hebei, Shaanxi and Beijing (FENG 1932, 1936; WU 1937, ZENG 1989) are doubtful. **First record for Gansu.**

Habitat. A rheobiotic species which lives in large, permanent, stony streams and rivers at higher altitudes between 1,000 and 4,000 m (Figs 17, 18). All the specimens known so far were collected at river banks under stones (JÄCH & JI 1998, WRASE & ŠŤASTNÝ, pers. com.). In Gansu *P. angulicollis, Agabus brandti* (Harold, 1880), *Nebrioporus airumlus* (Kolenati, 1845) (all Dytiscidae) and *Hydrocassis* sp. (Hydrophilidae) share the same habitat (Hájek *pers. comm.*).



Figs 1–4. *Platambus angulicollis* (Régimbart): 1, Habitus. 2, and 3, Aedeagus in lateral and dorsal view. 4, Left paramere (in the sense of MILLER & NILSSON 2003).

Analysis of some characters

As stated below, there are two characters that have been used most frequently for grouping species in the genus *Platambus*, and we discuss them here.

• Absence of setae at the distal posterior angles of metafemora (Figs 5–15).

It is true that *P. angulicollis* and the two most closely related species, *P. nepalensis* (Guéorguiev, 1968) and *P. satoi* Brancucci, 1982, have no setae at all (Fig. 8). The position is just marked by a few larger punctures. However, the same situation occurs in all the species of the subgenera *Agraphis* (Fig. 7) and *Anagabus* (Figs 5 and 6), and the number of punctures or minute setae varies from species to species. In the other *Platambus* species, the apical part of the femora may have a few sparse punctures as in *P. heterogynus* Nilsson, 2003, or a distinct row of larger setae as in *P. princeps* (Régimbart, 1888) (Fig. 13). However, most of the species have distinct punctures (e.g. *P. fimbriatus* Sharp, 1884, *P. incrassatus* Gschwendtner, 1935, *P. excoffieri* Régimbart,

1899, *P. schaefleini* Brancucci, 1988 and *P. wittmeri* Wewalka, 1975) (Fig. 9). In *P. biswasi* Vazirani, 1965, *P. strbai* Hendrich et Balke, 1998 and *P. maculatus* (Linnaeus, 1758) the setae are much longer and are distinctly visible (Figs 10–12). Only a few species have a well developed row of setae at the predistal posterior angle. This is the case in the black and depressed species *P. balfourbrownei* Vazirani, 1965, *P. princeps*, the species complex *P. schillhammeri* Wewalka et Brancucci, 1995, *P. dabeishanensis* Nilsson, 2003 as well as *P. ussuriensis* (Nilsson, 1997), which all have numerous, long and aligned setae similar to those in many *Agabus* species (Fig. 15); furthermore, they are situated in deep striae.

• Prosternal process.

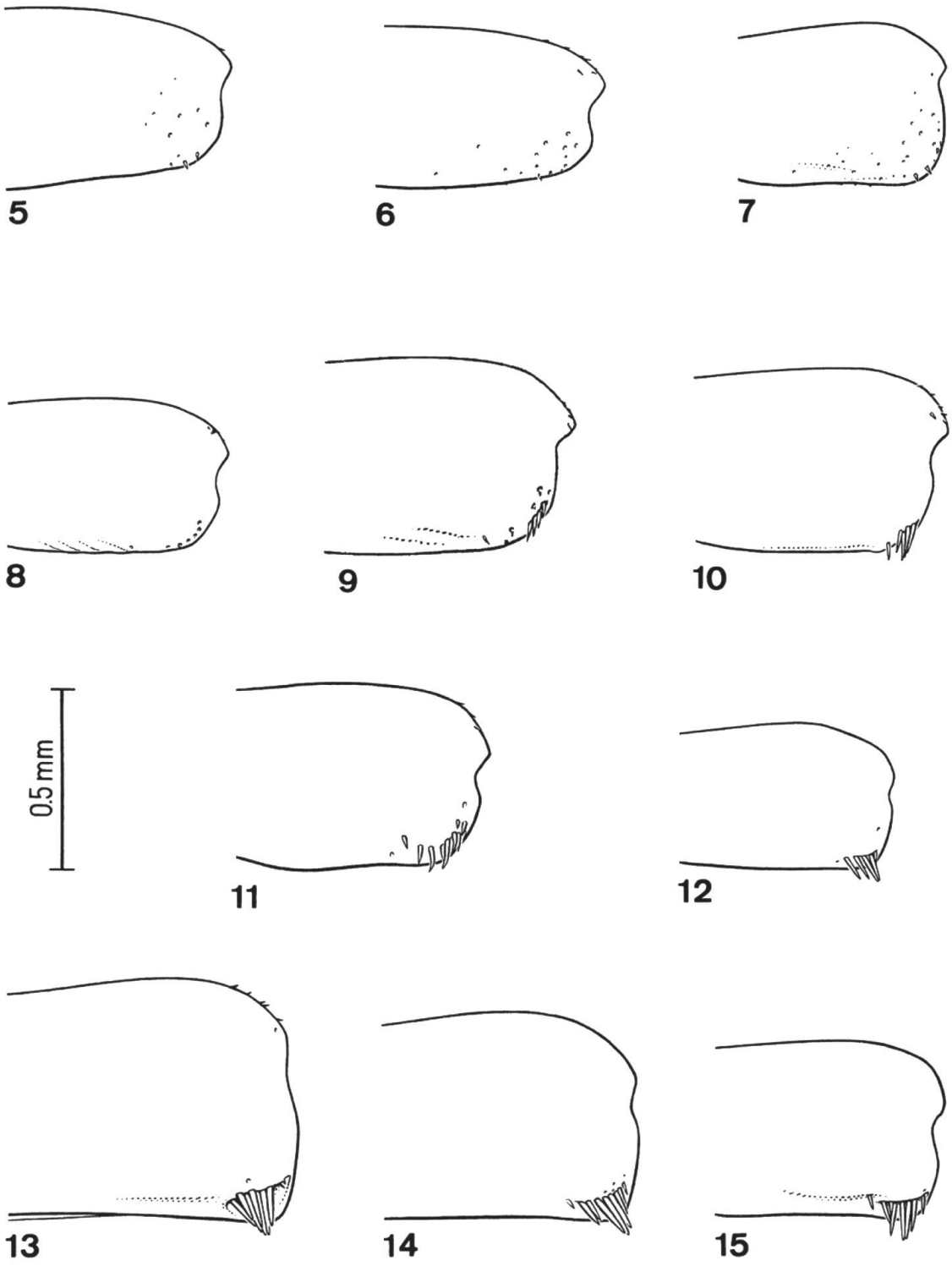
Taking all the species described in the genus *Platambus* into consideration, it was not possible to recognise any correlations which would help to understand the structure of this group. Even in obviously related species, the prosternal process does not seem to assist in the definition of phylogenetic relationships. For instance, that of *P. angulicollis* is characteristic, large, not bordered laterally and relatively flat. That of *P. nepalensis* is short, strongly bordered laterally, similar to that of *P. excoffieri* or of *P. wittmeri*. The third species related to *P. angulicollis* and *P. nepalensis*, *P. satoi*, has a short prosternal process comparable to that of *P. lindbergi* Guéorguiev, 1963, and of *P. pictipennis* (Sharp, 1873). Species obviously related to *P. princeps*, such as *P. balfourbrownei*, have a more oval, elongate prosternal process, not at all lanceolate.

Discussion

RÉGIMBART (1899) did not realise that this large species might belong to *Platambus*, and he placed it in the genus *Agabus*. Later, GUIGNOT (1948) described the subgenus *Stictogabus* exclusively for this species, based on the peculiarly flat and broad prosternal process as well as the trapezoid pronotum. Five years later, ZAITZEV (1953) noted that this species has no metafemoral setae. GUÉORGUIEV (1968) briefly discussed this, and in the same paper described *S. nepalensis*, recognizing the affinities of both species. He was aware that this latter character was not only found in that species but was also present in different Agabini. However, he retained the concept "*Stictogabus*" because of "one or two" supplementary striae between the sutural and discal striae, and he placed this genus in the Copelatini.

In his revision of the genus *Platambus*, the junior author (BRANCUCCI 1988) gave a new systematic assignment to both species. They were considered to belong to *Platambus*, and particularly because of the trapezoid form of the pronotum and the stronger structure of the elytra they are closely related to each other as well as to *P. satoi*.

We could not find any trace of extra striae in *P. angulicollis* or in *P. nepalensis*. On the basis of the discussion of the two characters above, *P. angulicollis* as well as the two related species *P. nepalensis* and *P. satoi* undoubtedly belong to the genus *Platambus*. They have no characters which indicate that they should be placed in a separate genus.



Figs 5–15. Distal part of metafemora (ventral view): 5, *Platambus* (*Anagabus*) *semenovi* (Jakovlev), 6, *P.* (*Anagabus*) *sogdianus* (Jakovlev), 7, *P.* (*Agraphis*) *kempi* (Vazirani), 8, *Platambus* (s.str.) *nepalensis* (Guéorguiev), 9, *P. pictipennis* Sharp, 10, *P. biswasi* Vazirani, 11, *P. maculatus* (Linnaeus), 12, *P. stygius* (Régimbart), 13, *P. princeps* (Régimbart), 14, *P. balfourbrownei* Vazirani, 15, *Agabus amoenus sinuaticollis* Régimbart.

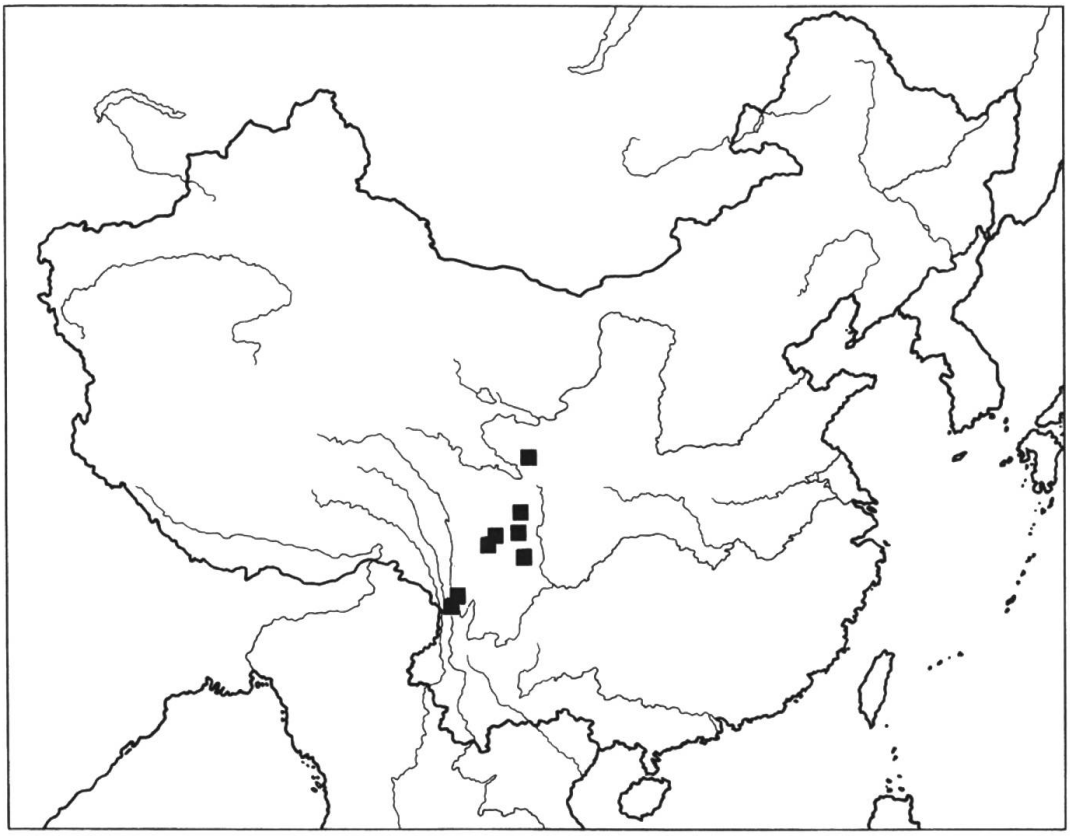


Fig. 16. Distribution of *Platambus angulicollis* (Régimbart) based on literature records, and specimens cited in this publication.

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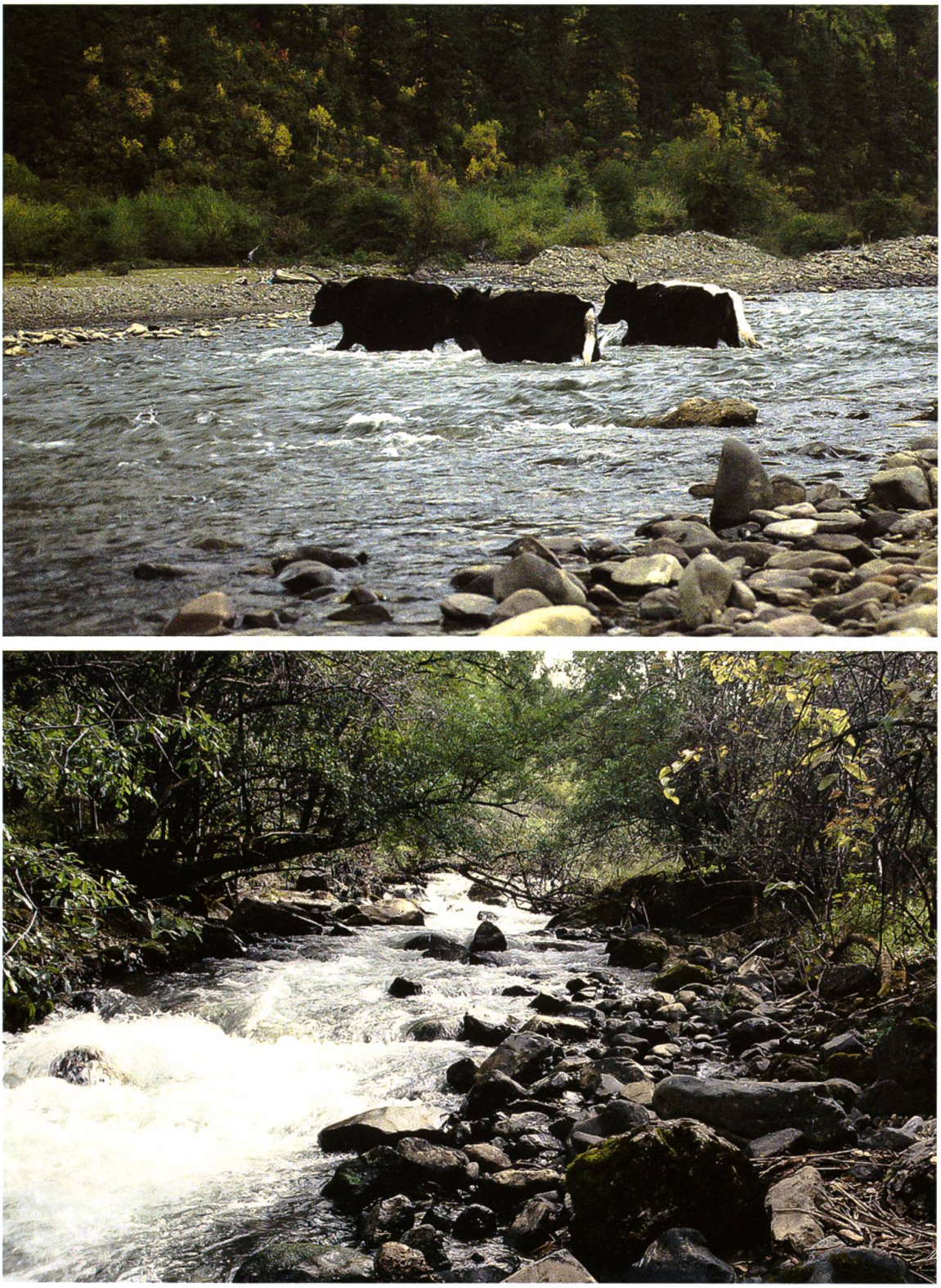

Figs 17–18. 17, Habitat of *P. angulicollis* (Régimbart): Stony river ca. 15 m wide, Yunnan prov.; ca. 4,000 m a.s.l., 32 km SE Zhongdian. All beetles were collected under stones at the river banks. 18, Yunnan prov.; ca. 2,700 m a.s.l., E Zhongdian; stony river in steep valley, ca. 10 m wide. All photos J. Šťastný.

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