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New taxa of Vizcayinae (Hemiptera: Auchenorrhyncha: Delphacidae), including a remarkable new genus from China

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Neovizcaya sinica gen. and sp. nov., the second genus of the delphacid subfamily Vizcayinae, is described and illustrated from Yunnan, south-west China. A key to the nine species of *Vizcaya* (the other genus of the subfamily) is provided, including the following four new species, which are described and illustrated: *V. aschei* sp. nov. (south India), *V. latifrons* sp. nov. (Taiwan), *V. longispinosa* sp. nov. (south-west China: south Yunnan) and *V. lombokensis* sp. nov. (Indonesia: Lombok). The new genus *Neovizcaya* is of special taxonomic and phylogenetic interest as it differs from *Vizcaya* in many characters. Based on these differences and from studies of the antennal sensilla, a revised definition of the subfamily is given. Micrographs of the antennae, egg, rostral apex and pretarsus of the subfamily are provided for the first time.

KEYWORDS: Asia, Delphacidae, Vizcayinae, new genus, new species, ultrastructure, antennal sensilla, egg, rostrum, pretarsus.

Introduction

The subfamily Vizcayinae (Hemiptera: Delphacidae) was established by Asche (1990) for the genus *Vizcaya* Muir with five species from southern India and South-East Asia. Vizcayinae is of considerable interest within the Delphacidae as it is regarded as a phylogenetic link between the Asiracinae and the remaining delphacids.

While sorting and identifying Delphacidae from material in the Insect Collections of the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS), a series of bizarre specimens, collected at Kunming, Yunnan, south-west China, were found that represent a remarkable new genus and species of the Vizcayinae. The new genus *Neovizcaya* gen. nov. differs from *Vizcaya* in many characters, necessitating changes in the definition of the subfamily Vizcayinae. In addition, four new species of the *Vizcaya* were also found from southwestern China (southern Yunnan), Taiwan, Lombok and southern India. These discoveries have greatly broadened our knowledge on the morphology, phylogeny and biogeography of the Vizcayinae. No information is currently available on the biology of these insects although most

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delphacids feed from the sap of Monocotyledones from which they feed close to the soil.

Materials and methods

The specimens studied in the course of this work are deposited in the following institutions whose names are abbreviated in the text as follows: BMNH, The Natural History Museum (formerly British Museum (Natural History)), London, UK; BPBM, Bernice P. Bishop Museum, Honolulu, Hawaii, USA; CAS, California Academy of Sciences, San Francisco, CA, USA; HUS, Laboratory of Systematic Entomology, Hokkaido University, Sapporo, Japan; IZCAS, Institute of Zoology, Chinese Academy of Sciences, Beijing, P.R. China; MNHU, Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.

For SEM studies, dry pinned specimens were employed. Specimens were placed and cleaned in 10% KOH for 20 min, then washed in distilled water twice, mounted on aluminium stubs by double-sided sticky tape, air-dried at room temperature, and coated with gold-palladium using a sputter coater. Observations were made with a Zeiss DSM 950 or a JEOL 5200LV scanning electron microscope, operated at accelerating voltages of 10–25 kV.

Morphological terminology follows that of Asche (1985, 1990) and Lewis and Marshall (1970) and Marshall and Lewis (1971) (antennal sensilla).

Checklist of Vizcayinae

Vizcayinae Asche, 1990
Neovizcaya gen. nov.
  sinica sp. nov.—SW China (Yunnan).
Vizcaya Muir, 1917
  adornata Asche, 1990—Indonesia (Sulawesi).
  aschei sp. nov.—south India (Madras).
  bakeri Muir, 1917—Philippines (Luzon).
  latifrons sp. nov.—Taiwan.
  lombokensis sp. nov.—Indonesia (Lombok).
  longispinosa sp. nov.—SW China (Yunnan).
  orea Asche, 1990—Indonesia (Sumatra), Thailand (Doi Suthep, Chiangmai), Vietnam (Ban Me Thuot).
  piccola Asche, 1990—Malaysia (Sarawak).
  vindaloa Asche, 1990—south India (Travancore).

Subfamily VIZCAYINAE Asche

Vizcayinae Asche, 1990: 157. Type genus: *Vizcaya* Muir, 1917: 351.

Included genera. *Vizcaya* Muir (nine species), *Neovizcaya* gen. nov. (one species).

Distribution. South India, south-west China and South-East Asia.

Remarks. The taxonomic position of Vizcayinae is problematical. Asche's (1990) phylogenetic analysis of the Delphacidae indicated that the Vizcayinae formed a link between the Asiracinae and the remaining Delphacids (Kelisiinae, Stenocraninae, Plesiodelphacinae and Delphacinae). However, based on characters of the nymph, Emeljanov (1995) downgraded the Vizcayinae to a tribe of Delphacinae. Emeljanov (1995) also questioned the polarity of an autapomorphy

proposed by Asche (1990)—the arrangement of teeth on the tip of the basal segment of the metatarsi (see below). In the current work, Asche's (1990) subfamily placement of Vizcayinae is followed pending further work on the group.

Vizcayinae can be distinguished from all other delphacid subfamilies by the following combination of characters (from Asche, 1990 with new characters in italics): vertex with an inverted 'v'-shaped carina (figure 44); antennal scape and pedicel very or *moderately* elongate, scape compressed (figures 10, 15, 46, 49) [similar to Asiracinae]; antennal pedicel with numerous sensory plaque organs, irregularly arranged over the whole surface (figures 10, 15, 16) [similar to Asiracinae: Ugyopini and some Delphacinae]; *sensory plaque organs on pedicel surface with relatively few (8–12) denticles and relatively few (17–28) digitate processes* (figures 11, 17); *denticles relatively large and broad, compressed and curved inwardly, nearly pyramidical with acute apex, outer edge curved and distinctly keel-like, the depressed surface with one to three indistinct longitudinal ridges* (figures 11, 17) [similar to Asiracini (see Shih and Yang, 1996; Liang, 1998)]; *basal pit of flagellum traversed by a cuticular spinose process* (figure 14); metatibial spur conical in shape, with 5–12 teeth (including apical tooth) on inner margin (figures 18, 20) [similar to Kelisiinae, Plesiodelphacinae and some Delphacini]; apical pecten row of the 1st metatarsomere with the median spine smaller than the remainder and displaced proximally (arrowed in figure 53); forewings elongate with veins prominent and thickly covered with granules each bearing a long seta [similar to Asiracinae]; 2nd abdominal tergite of male drumming organ with a deep central depression (arrowed in figure 19).

One of the characters used by Asche (1990) to support the monophyly of the Vizcayinae is absent in *Neovizcaya*. This is the smoothly rounded fore margin of the head in *Vizcaya* which is strongly compressed in *Neovizcaya*.

The two Vizcayinae genera can be distinguished by the characters noted in table 1.

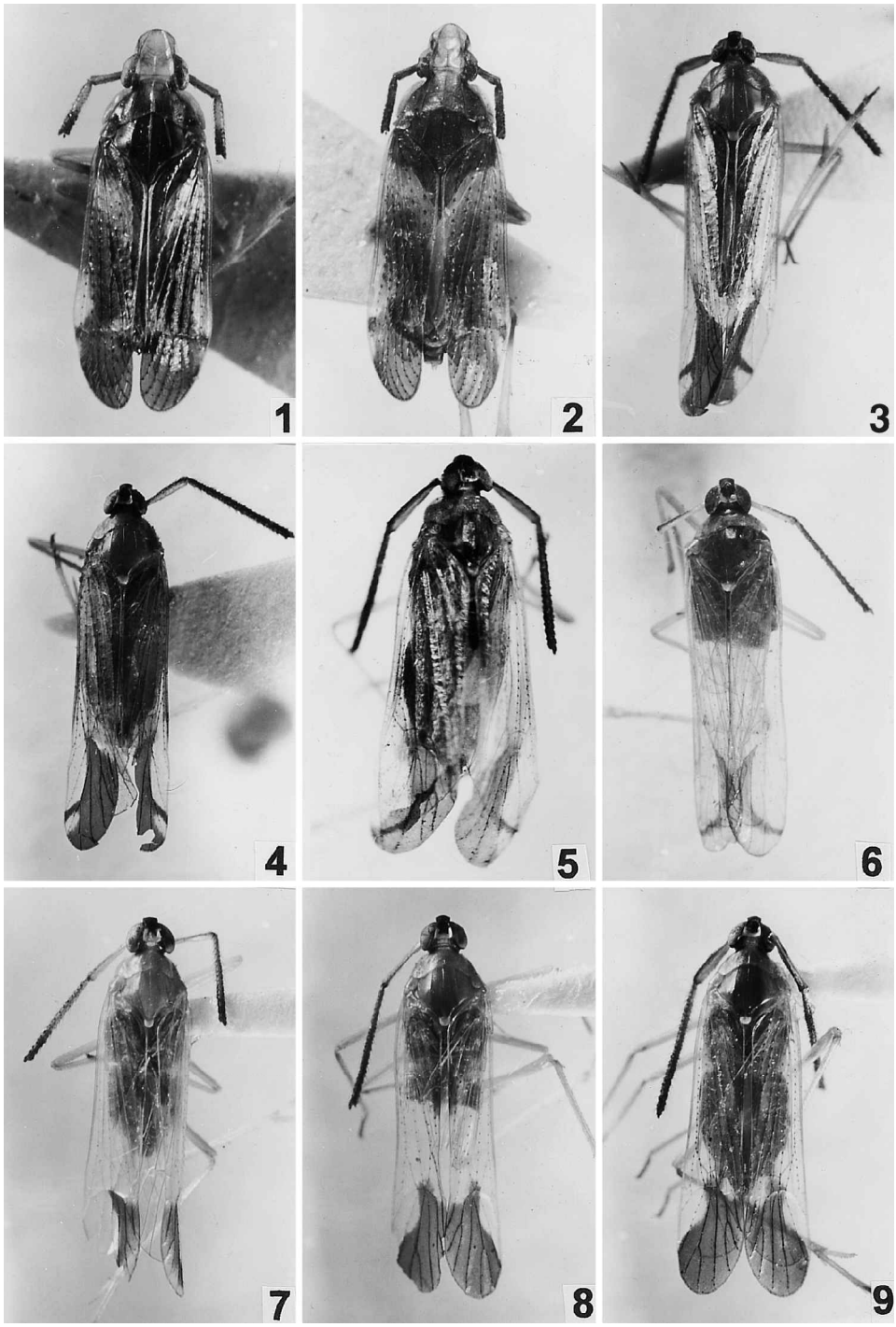
Description of taxa

Neovizcaya gen. nov.

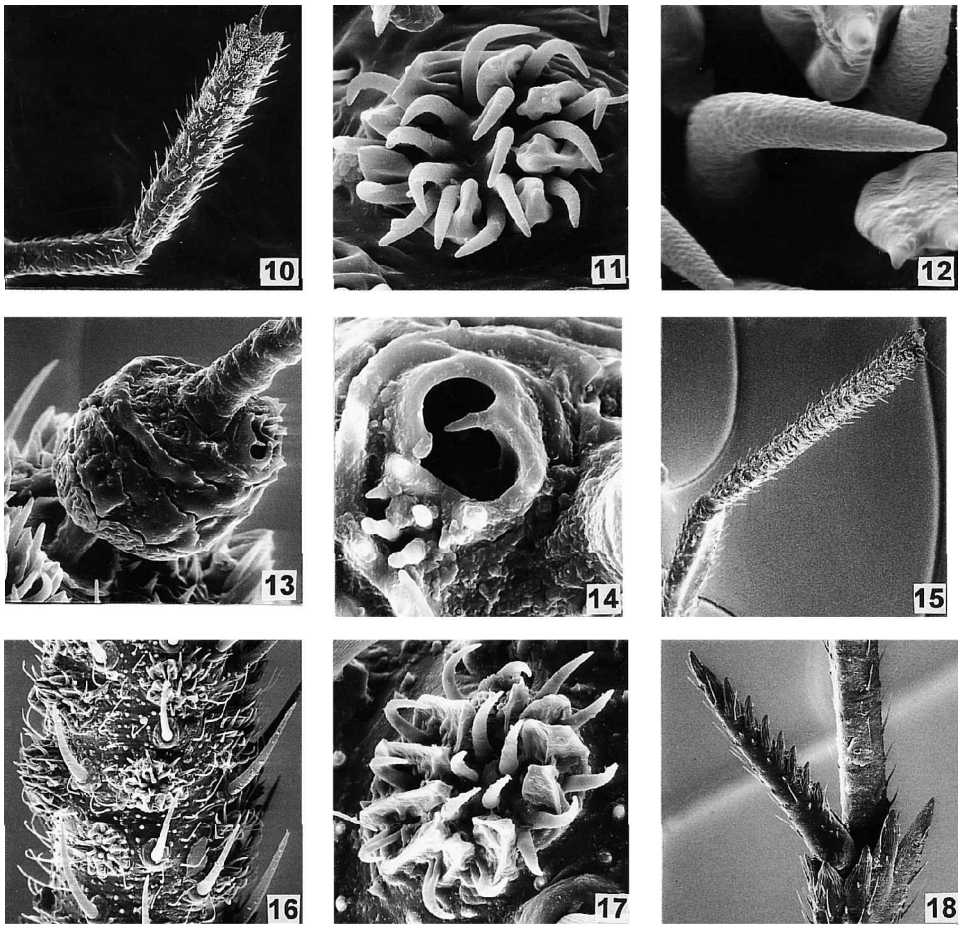
Type species: *Neovizcaya sinica* sp. nov.

Small, slender, somewhat dorsoventrally flattened delphacid.

Head relatively large and flat, longer and narrower than pronotum, gradually tapered from base to apex in lateral aspect. Vertex long, medially about 1.6× longer than broad at base, about 1.4× length of pronotum, distinctly extending in front of eyes, broad at base and converging anteriorly, apex somewhat broad, posterior margin nearly straight, lateral margins laminately carinate and gradually converging from base to apex and diverging at mid-length to lateral margins of frons, disk of vertex much depressed, sloping to apex, with an indistinct 'Y'-shaped ridge on posterior half. Frons large, smooth, apex rounded in ventral aspect, gradually broadened from upper to lower part, widest slightly above frontoclypeal suture, about 1.4× higher than maximum width, upper part much depressed, lower part distinctly convex, lateral margins carinate, without medial longitudinal carina. Postclypeus much narrower than frons, convex and smooth, lateral margins slightly carinate, without medial carina. Anteclypeus convex, without lateral and medial carinae. Rostrum long, reaching beyond hind trochanters. Compound eyes in lateral view elongate, kidney-shaped, distinctly incised medially above antennal base from inferior margin to about one-half height of eye. Antennae relatively long (but much

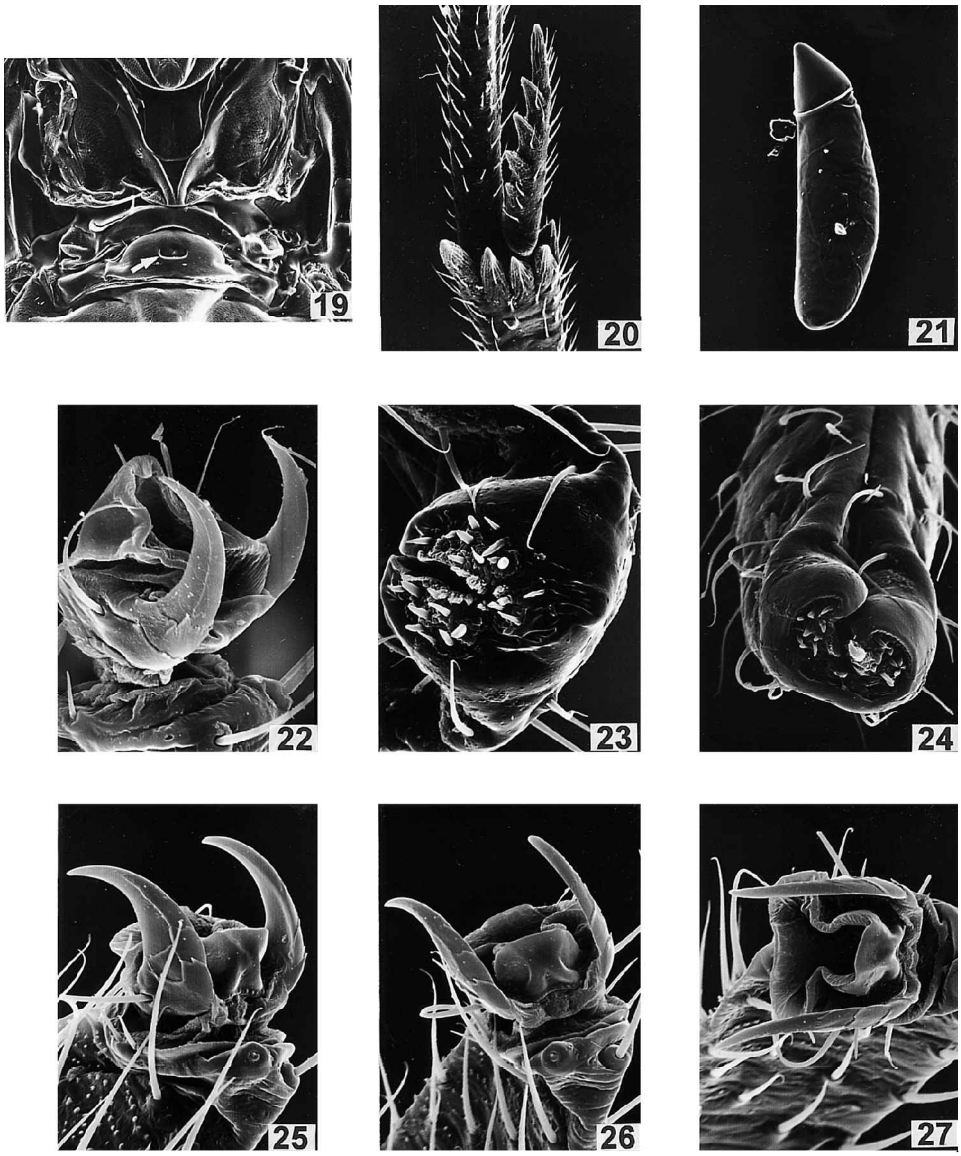


FIGS 1–9. Dorsal habitus of *Neovizcaya* and *Vizcaya* species: (1, 2) *N. sinica* (♂♀, paratypes, China: Yunnan (IZCAS)); (3, 4) *V. longispinosa* (♀, paratypes, China: Yunnan (IZCAS)); (5) *V. latifrons* (♀, holotype, Taiwan (HUS)); (6) *V. lombokensis* (♂, holotype, Lombok (HUS)); (7) *aschei* (♂, holotype, S. India: Madras (CAS)); (8, 9) *V. vindaloa* Asche (♂♀, S. India: Madras (CAS)).



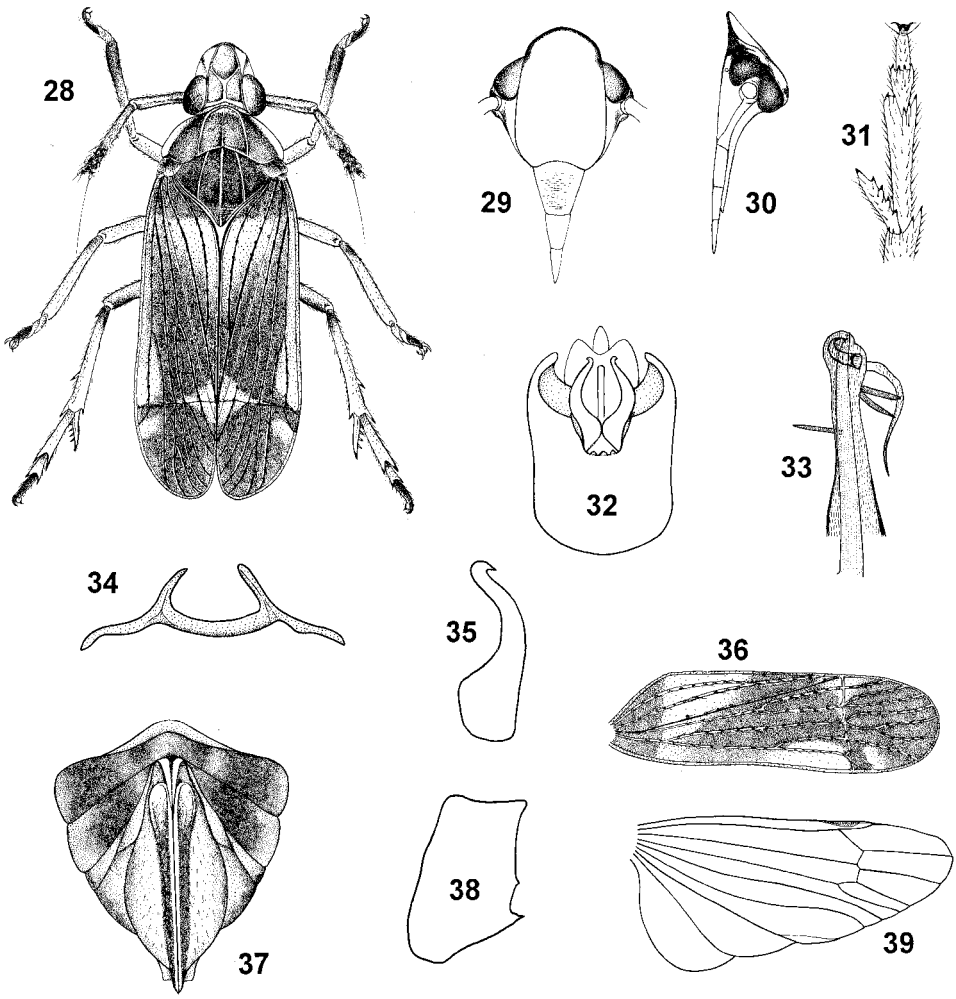
FIGS 10–18. External morphology of Vizcayinae (SEM). (10–14) *Neovizcaya sinica* sp. nov., (10) left antenna of male, frontal view; (11) a sensory plaque organ on pedicel; (12) pitted cuticular process of a plaque organ; (13) swollen flagellar base; (14) top opening of swollen flagellar base, dorsal view; (15–18) *Vizcaya longispinosa* sp. nov., (15) right antenna of male, frontal view; (16) part of pedicel; (17) a sensory plaque organ on pedicel; (18) distal end of metatibia and basal part of metatarsomere I.

shorter in comparison with *Vizcaya*) with apex of 2nd segment reaching only base of forewings in respose; 1st segment shorter than median length of vertex, depressed, distinctly concave on inner side; 2nd segment terete, about 1.7–1.8× longer than 1st, with more than 20 sensory fileds irregularly distributed over distal surface; both 1st and 2nd segments with numerous sturdy bristles on surface. Pronotum relatively large, shorter than head, distinctly separated from head; disk convex, strongly tricarinate, anterior margin nearly straight, posterior margin angularly incurved; strongly sloping laterad and curved down, extreme lateral areas strongly foliaceous and somewhat reflexed. Mesonotum with anterior margin projected under posterior margin of pronotum, disk relatively flat and strongly tricarinate, sloping laterad, caudal tip concave and faintly transversely striate basally. Forewings (figure 36) elongate, nearly parallel-sided, surpassing abdomen by about one-third of total length and 3.9× longer than maximum width, widest slightly distad of nodal line,



FIGS 19–27. External morphology of Vizcayinae (SEM). (19–23) *Neovizcaya sinica* sp. nov., (19) male metathorax and abdominal segments I–III, dorsal view; (20) distal end of metatibia and basal part of metatarsomere I; (21) egg; (22) pretarsus of hind leg; (23) apex of rostrum; (24–27) *Vizcaya longispinosa* sp. nov., (24) apex of rostrum; (25–27) pretarsus of hind leg.

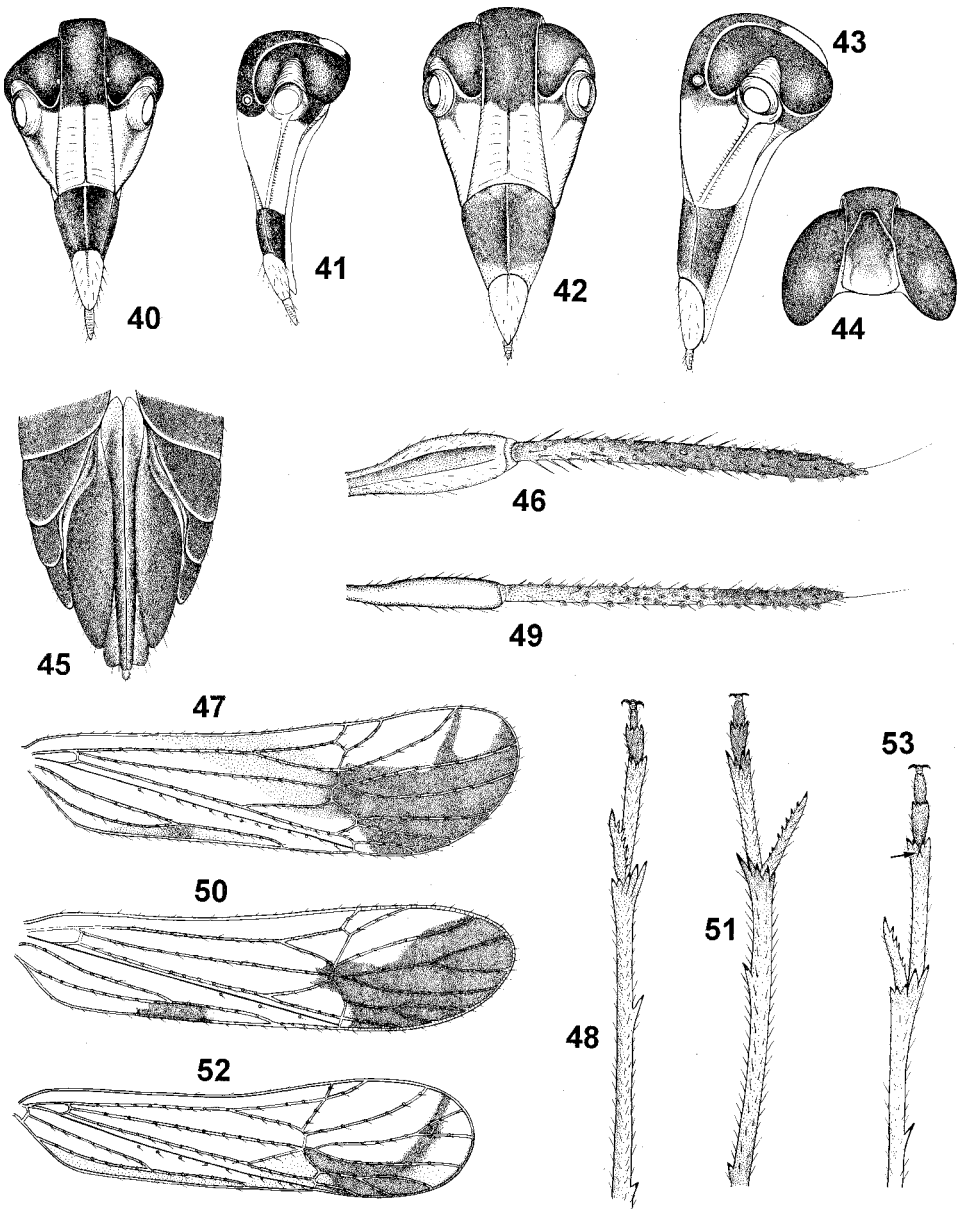
narrowest at basal one-third; veins prominent and thickly covered with granules each with a long seta; costal membrane without transverse veins, Sc and R and Cu1a and Cu1b branching near mid-length of wing with outer and inner anteapical cells relatively large; subapical transverse nodal line relatively straight. Hindwings wider than forewings, venation as in figure 39. Legs moderately elongate and slender, fore and middle coxae long, smooth and somewhat concave in ventral view, fore femora and tibiae normal, not foliaceously dilated; hind tibiae with two lateral teeth,



FIGS 28–39. *Neovizcaya sinica* sp. nov. (28) male holotype; (29) head, ventral view; (30) head, lateral view; (31) distal end of metatibia and metatarsus; (32) male genitalic capsule, ventrocaudal view; (33) aedeagus, dorsal view; (34) second abdominal apodeme of male, caudal view; (35) right parameres, ventrolateral view; (36) left forewing; (37) female genitalia, ventral view; (38) male pygofer, lateral view; (39) right hindwing.

the basal one near the base, very small and indistinct, the distal one beyond the middle prominent, metatibial spur conical, with five teeth (including apical tooth) on inner margin (figures 20, 31), metatarsomere I long, about 1.1× longer than metatarsomeres II+ III, black-tipped spines at end of hind tibiae and metatarsomeres I and II numbering 5, 5 and 4, respectively; pretarsus with one long seta on each unguis and one pair of relatively long setae on arolium (figure 22).

Drumming organ sexually dimorphic: in females as in *Vizcaya*; in males second abdominal tergite dilated, convex, with a shallow oval depression centrally (arrowed in figure 19); metapostnotum with a pair of very slender apodemes directed caudad; 2nd abdominal sternite with a pair of elongate apodemes directed dorsocaudad (figure 34).



FIGS 40–53. External morphology of *Vizcaya* species. (40, 41) *V. longispinosa* sp. nov., (40) head, ventral view; (41) head, lateral view; (42–48) *V. latifrons* sp. nov., (42) head, ventral view; (43) head, lateral view; (44) vertex, dorsal view; (45) female genitalia, ventral view; (46) left antenna, frontal view; (47) left forewing; (48) metatibia and metatarsus; (49–51) *V. vindaloa* Asche, (49) antenna; (50) left forewing; (51) metatibia and metatarsus; (52, 53) *V. lombokensis* sp. nov., (52) left forewing; (53) metatibia and metatarsus.

Male genitalia with pygofer (figures 32, 38) in lateral view trapezoid, in caudal view circular, ventrally about 1.3× longer than dorsally, laterodorsal edges strongly produced caudad in lateral view, without teeth on dorsal margin, laterocaudal

Table 1. Comparisons between *Vizcaya* and *Neovizcaya*.

	Vizcaya	*Neovizcaya*
Body size	Large, body length 4.9–6.5 mm	Small, body length 3.8–4.8 mm
Body form	Subcylindrical	Dorsoventrally compressed
Head	Narrow, a little protruding in front of eyes	Very broad, well protruding in front of eyes
Vertex	Normal	Strongly dorsoventrally compressed
Vertex carinae	Very fine and weak, without 'Y'-shaped ridge on posterior half	Strong and distinct, with an indistinct 'Y'-shaped ridge on posterior half
Frons	Narrow	Very broad
Antenna	Extremely elongate, apex of pedicel reaching basal one-third to one-half of the costal margin of forewings in respose	Moderately elongate, apex of pedicel reaching base of forewings in respose
Pronotum and mesonotum	Narrow, disk arched, lateral margins normal; median and lateral carinae very weak and indistinct	Broad, relatively flat, lateral margins laminate and reflexed; median and lateral carinae very strong and very distinct
Number of metatibial spur spines	6–12	5
Egg	Without ring-like hatching cap at apex	With ring-like hatching cap at apex
Distribution	S. India, SW China (Yunnan), SE Asia, Philippines (Luzon) and Indonesia (Sumatra, Sulawesi, Lombok)	SW China (Yunnan)

margins broadly rounded to diaphragm, median processes on ventrocaudal margin small, acute, widely separated; ventral angles of pygofer acute, tooth-like in lateral view, distance between ventral angles great; anal tube short and broad, lateroapical angles produced into short, ventrally directed process. Anal style small and short. Parameres (figure 35) in ventral view arched, basally expanded and broad in inner side, gradually tapering to apex, apex with a very small laterally recurving hooked barb, nearly beak-shaped in lateral view. Aedeagus (figure 33) with shaft elongate, slender, slightly depressed ventrodorsally, gradually tapered from base to apex, with one elongate, sinuate process directed ventrally and two relatively short and acute spinose processes apically on right side, and one short and acute spinose process subapically on left side.

Female genitalia as in figure 37. Eggs (figure 21) much smaller than those of *Vizcaya* with distinct ring-like hatching cap at apex—Asche (1990: 175) reported that no ring-like hatching cap was seen in the eggs of *Vizcaya*.

Etymology. The generic name is derived from Greek *neo-*, new, and the existing genus name *Vizcaya*. Gender: feminine.

Included species and distribution. One species; south-west China (Yunnan).

Neovizcaya sinica sp. nov.
(figures 1, 2, 10–14, 19–23, 28–39)

Length (from apex of vertex to tip of forewings): ♂ 3.8–4.2 mm; ♀ 4.5–4.8 mm; length of 1st+ 2nd antennal segments 1.2–1.3 mm.

Vertex pale yellowish, posterior area sometimes with brownish suffusion, lateral carinae brown; frons, postclypeus, anteclypeus, genae and lora pale yellowish, anterior margin and upper part of lateral margins of frons, sides in front of and above compound eyes (figure 30), and lora in female, brown; antennae brown, distal half of 2nd segment blackish brown, bristles pale yellowish brown; rostrum pale yellowish, apex blackish brown; pronotum dark brown or blackish brown, lateral areas pale yellowish, disc sometimes yellowish brown; mesonotum shining blackish brown; forewings blackish brown, costa yellowish brown, a broad oblique transverse fascia near base, an elongate longitudinal subapical costal spot which is posteriorly crossed by a blackish brown fascia, and a small irregular spot near apex of clavus whitish and subhyaline; granuales on veins brown, setae on veins pale yellowish brown; hindwings hyaline with veins brownish; thorax beneath pale yellowish, lateral areas of meso- and metapleurae dark brown; legs pale yellowish, claws and metatarsomere III, base of coxae, base and distal two-thirds of fore tibiae, base of middle tibiae, inner side of hind femora and base of hind tibiae brown or suffused with brown, tips of lateral and apical teeth on hind tibiae and tarsi, and tips of lateral and apical teeth of metatibial spurs black; abdomen brown or dark brown, posterior segmental margins, ventrolateral areas of tergites, and a central longitudinal band on sternites yellowish brown or reddish brown; female genitalia with valvifers VIII and lateral gonapophyses IX yellowish, with brownish tinge.

Male and female genitalia as in generic description (figures 32, 33, 35, 37, 38).

Etymology. This new species is named for its occurrence in China.

Material examined. HOLOTYPE ♂, **China**: Yunnan Province, Kunming, Heilongtan, 1900 m, 24 August 1958 (Y.-R. Zhang) (IZCAS). PARATYPES: **China**: 17♂, 8♀, same data as holotype (15♂, 6♀ in IZCAS; 2♂, 2♀ in BMNH; 1♂, 1♀ in MNHU).

Distribution. South-west China (Yunnan).

Genus *Vizcaya* Muir

Vizcaya Muir, 1917: 351; Metcalf, 1943: 68; Asche, 1990: 158. Type species: *Vizcaya bakeri* Muir, 1917, by monotypy.

Vizcaya comprises a very uniform group of delphacids which can be easily distinguished by the following combination of characters: body slender in appearance with legs and forewings long; antennae with scape and pedicel both strongly elongate, scape slightly or well dilated, pedicel terete with numerous sensory fields, which are irregularly arranged over the whole surface (figures 10, 15, 16); legs very elongate and slender, hind leg spine formula 5:5:4, metatibial spur conical in shape, with 6–12 teeth (including apical tooth) on inner margin; head small and narrow, transition of vertex to frons smooth and rounded; head and pronotum predominantly ochraceous with vertex, upper half of frons, postclypeus and lora shining black, forewings (figures 47, 50) usually with a large, distinct fuscous patch at apical area beyond nodal line (excluding costal area) and with or without a short fuscous stripe which branches from the fuscous patch and runs to costal margin, clavus and basal costal area usually marked with fuscous; abdomen usually blackish. For details of the antennal sensilla, egg, rostrum and pretarsus (shown for the first time) (see figures 10–17, 21–27).

Included species and distribution. Nine species; S. India, Philippines (Luzon), Indonesia (Sulawesi, Lombok (new record)), Malaysia (Sarawak), Thailand, Vietnam, SW China (south Yunnan) (new record), Taiwan (new record).

Key to species of *Vizcaya*

1 First antennal segment well dilated, relatively broad and short (figures 15, 46) . . 2
– First antennal segment slightly dilated, relatively slender and elongate (figure 49) . . 5

2 Anteclypeus relatively broad basally (figure 42); Taiwan . . . . *latifrons* sp. nov.
– Anteclypeus relatively narrow basally (figure 40) 3

3 Aedeagus with apical left spinose process elongate and slender, reaching almost one-half length of theca (figure 59); SW China (Yunnan) . . . . *longispinosa* sp. nov.
– Aedeagus with apical left spinose process relatively short and stout, reaching almost one-third length of theca 4

4 Forewings with apical fuscous patch relatively elongate, without fuscous stripe at apical costal area (see Asche, 1990: figure 24); aedeagal shaft with apical spinose processes relatively short and slender (see Asche, 1990: figure 31); metatibial spur with six (left)+ eight (right) teeth; Philippines (Luzon) . . . . . *bakeri* Muir
– Forewings with apical fuscous patch relatively short, with short fuscous stripe at apical costal area (see Asche, 1990: figure 33); aedeagal shaft with apical spinose processes relatively elongate and broad (see Asche, 1990: figure 43); metatibial spur with 9–11 teeth; Indonesia (Sumatra), Thailand (Doi Suthep, Chiangmai), Vietnam (Ban Me Thuot) . . . . . *orea* Asche

5 Costal area of forewings with a longitudinal fuscous stripe 6
– Costal area of forewings hyaline 7

6 Forewings with apical fuscous patch relatively elongate and broad, fuscous stripe at apical costal area short, costal area with narrow longitudinal fuscous stripe, clavus with one complete elongate fuscous stripe (see Asche, 1990: figure 7); metatibial spur with seven teeth; Indonesia (Sulawesi) . . . . . *adornata* Asche
– Forewings with apical fuscous patch small and short, with fuscous stripe at apical costal area very long, costal area with broad longitudinal fuscous stripe connecting the apical fuscous patch, clavus with two disjunct patches: one basal and another subapical (see Asche, 1990: figure 46); metatibial spur with six teeth; Malaysia (Sarawak) . . . . . *piccola* Asche

7 Body extremely elongate (figure 6); forewings with apical fuscous patch very narrow and slender, occurring less than one-third of the apical area, clavus without any brown suffusion (figure 52); aedeagus with two short apical processes, equal in length, expanded subapically and acute apically (figure 74); right metatibial spur with six teeth; Indonesia (Lombok) . . . . . *lombokensis* sp. nov.
– Body moderately elongate; forewings with apical fuscous patch relatively large occurring more than one-third of the apical area, clavus with distinct brown suffusion; aedeagus with two or three narrow apical processes of unequal length (figure 64); metatibial spur with nine or more teeth 8

8 Forewings with apical fuscous patch relatively broad and large (figures 8, 9, 50); pygofer with laterodorsal edges with one tooth subapically on dorsal margin (figure 66); aedeagal shaft with three stout apical spinose processes (figure 69); metatibial spur with 9 (left)+ 12 (right) teeth; south India (Travancore) . . . . *vindaloa* Asche
– Forewings with apical fuscous patch narrow and slender (figure 7); pygofer with laterodorsal edges without teeth subapically on dorsal margin (figure 61); aedeagal shaft with two very slender apical spinose processes (figure 64); metatibial spur with nine teeth; south India (Madras) . . . . . *aschei* sp. nov.

Vizcaya aschei sp. nov.
(figures 7, 60–64)

Length: ♂ 6.0 mm.

Externally similar to *V. vindaloa* Asche (see description of *vindaloa* given by Asche, 1990: 174) but forewings (figure 7) with the apical fuscous patch very narrow, slender, evenly broad and nearly C-shaped, the apical margin and the apical inner margin hyaline, and the fuscous longitudinal stripe in clavus between common stem of anal veins and inner margin very short, small and nearly triangular and metatibial spur with nine teeth (including apical tooth) on inner margin.

Male genitalia with pygofer (figures 60, 61) short and high, long ventrally and short dorsally in lateral aspect, laterodorsal edges relatively broadly produced caudad, without teeth subapically on dorsal margin; median projection of ventrocaudal margin (figure 63) moderately long, slightly V-shaped distally in ventral aspect; anal tube short, broad, somewhat rounded, and apical margin incised medially in dorsal view, anal styles very short, small and slender (figure 62); parameres (figure 60) relatively narrow and slender, nearly S-shaped in lateral aspect, distinctly broad subbasally, apical one-third evenly broad, apex slightly acute; aedeagus (figure 64) with shaft long and slender, depressed ventrodorsally, with two slender, ventrally directed, spinose processes apically, one relatively long, reaching near mid-length of the shaft, the other short.

Etymology. This new species is named in honour of Dr Manfred Asche, Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany for his very valuable contribution to the world delphacid systematics and for whose pioneering work on the Vizcayinae has made this work possible.

Distribution. Southern India.

Material examined. HOLOTYPE ♂, **South India**: Madras State, Anamalai Hills, Cinchona, 1067 m, May 1959 (P. S. Nathan) (CAS). PARATYPE: **South India**: 1♂, Madras State, Nilgiri Hills, Devala, 675 m, May 1961 (P. S. Nathan) (CAS).

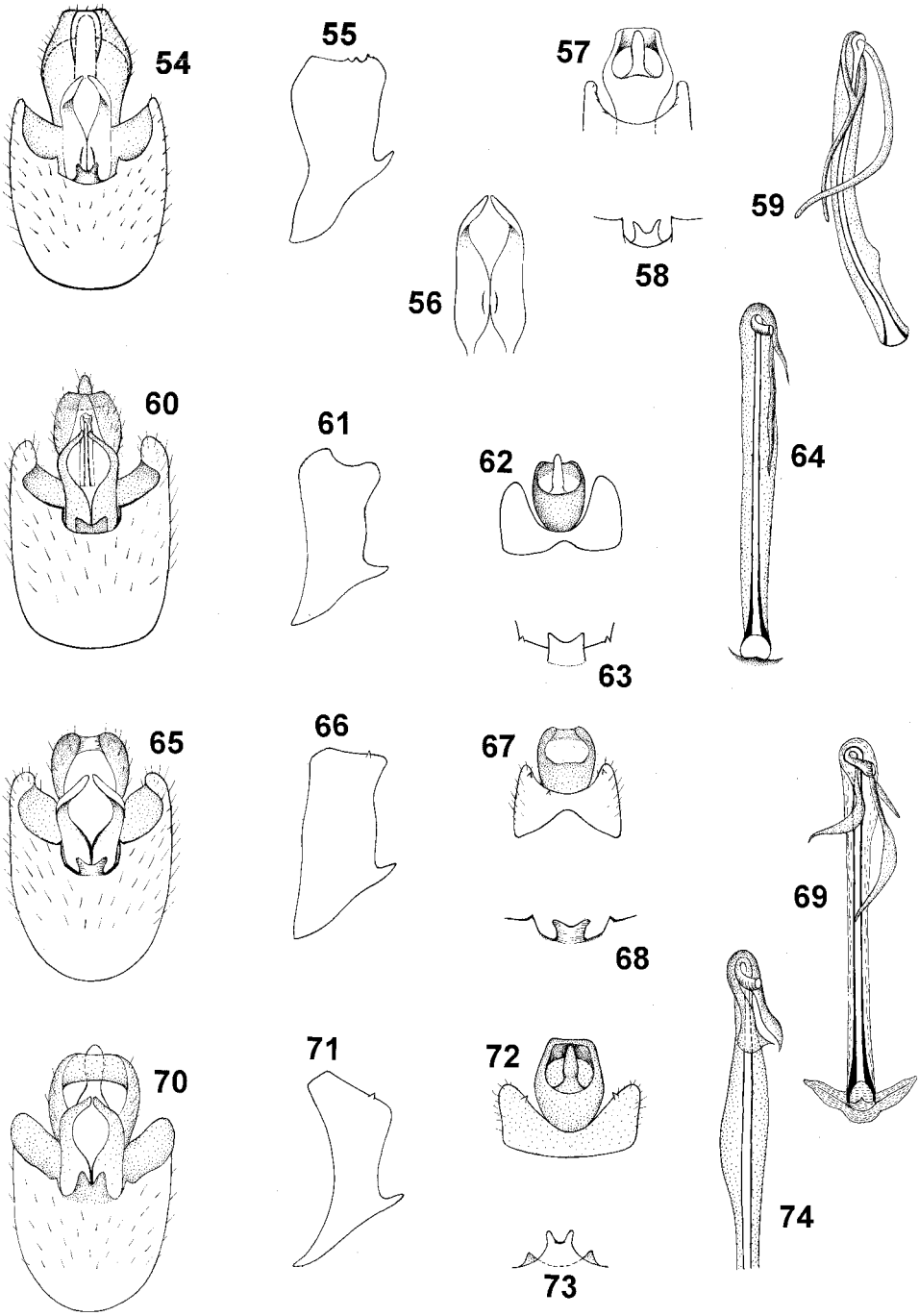
Remarks. This species is similar to another Indian species, *V. vindaloa*, but can be distinguished by the characters noted in the above description.

Vizcaya latifrons sp. nov.
(figures 5, 42–48)

Female. Length: 6.7 mm.

Externally similar to *V. orea* (see description of *orea* given by Asche, 1990: 168) but discal areas of pro- and mesonotum more ochraceous, anteclypeus relatively

FIGS 54–74. Male genitalia of *Vizcaya* species. (54–59) *V. longispinosa* sp. nov., (54) genital capsule, ventrocaudal view; (55) pygofer, lateral view; (56) parameres, ventral view; (57) anal segment, dorsal view; (58) median projection of ventrocaudal margin of pygofer, ventral view; (59) aedeagus, left dorsolateral view; (60–64) *V. aschei* sp. nov., (60) genital capsule, ventrocaudal view; (61) pygofer, lateral view; (62) anal segment, dorsal view; (63) median projection of ventrocaudal margin of pygofer, ventral view; (64) aedeagus, dorsal view; (65–69) *V. vindaloa* Asche, (65) genital capsule, ventrocaudal view; (66) pygofer, lateral view; (67) anal segment, dorsal view; (68) median projection of ventrocaudal margin of pygofer, ventral view; (69) aedeagus, dorsal view; (70–74) *V. lombokensis* sp. nov., (70) genital capsule, ventrocaudal view; (71) pygofer, lateral view; (72) anal segment, dorsal view; (73) median projection of ventrocaudal margin of pygofer, ventral view; (74) aedeagus, dorsal view.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broad basally, forewings with the brown longitudinal stripe in clavus between common stem of anal veins and inner margin of wing short and distinct only in basal one-half, and metatibial spur with seven teeth (including apical tooth) on inner margin.

Male. Unknown.

Etymology. This species is named for its relatively broad frons.

Material examined. HOLOTYPE ♀, **Taiwan**: [underside] Horisha [in Japanese], 30 April [19]07; Matsumura (HUS).

Distribution. Taiwan. This is the first report of *Vizcaya* species from Taiwan.

Remarks. This species can be distinguished from all other known species in the genus by its 1st antennal segment being well dilated and relatively broad and short, pro- and mesonotum with disc areas more ochraceous, relatively broad anteclypeus, forewings with broad fuscous patch at apical area and short fuscous stripe at apical costal area and metatibial spur with seven teeth (including apical tooth) on inner margin.

Based on the antennae this species forms a group with *longispinosa* sp. nov., *bakeri* Muir and *orea* Asche, all having well dilated and relatively broad and short 1st segment. The discovery of a male and study of the male genitalia of this species are particularly desirable to determine its relationship to other species.

Vizcaya lombokensis sp. nov.
(figures 6, 52, 53, 70–74)

Length: ♂ 5.7 mm.

External characters and colour as in *V. adornata* Asche (see description of *adornata* given by Asche, 1990: 160) but differs in its smaller size, narrower body, base and basal lateral margins of vertex and central and posterior areas of pronotum pale ochraceous, forewings with apical fuscous patch greatly reduced, very small, narrow and slender, occurring over less than one-third of the apical area, the fuscous stripe at apical costal area very long, clavus and costal margin without distinct fuscous suffusion (figure 52) and the right metatibial spur with six teeth (including the apical tooth) (left hind leg missing).

Male genitalia with pygofer (figures 70, 71) distinctly long ventrally and very short dorsally in lateral aspect, laterodorsal edges distinctly produced caudad, with one distinct, small tooth subapically on dorsal margin; median projection of ventrocaudal margin of pygofer narrrow, nearly V-shaped distally in ventral aspect (figure 73); paramere (figure 70) relatively evenly broad, gradually tapered from subbasal part to apex; aedeagus (figure 74) with shaft expanded mesially, with two short, equal-lengthed, relatively broad, ventrally directed, apical spinose processes, both processes expanded subapically with apex acute.

Etymology. This species is named for its occurrence in Lombok.

Material examined. HOLOTYPE ♂, **Indonesia**: Lombok, Sapit, 2000 ft, April 1896 (H. Fruhstorfer), [Matsumura's handwriting] *Hygops* [*sic*] *curvfascia* det. Matsumura (HUS).

Distribution. Indonesia (Lombok). This is the first report of *Vizcaya* species from Lombok.

Remarks. This species differs from other species by its more slender body (figure 6). In other respects it is similar to *V. adornata* Asche but differs in the characters noted in the above description.

Vizcaya longispinosa sp. nov.
(figures 3, 4, 15–18, 24–27, 40, 41, 54–59)

Length: ♂ 6.4 mm; ♀ 6.5–6.7 mm

Externally similar to *V. orea* Asche (see description of *orea* given by Asche, 1990: 168). Metatibial spur with 8–11 teeth (including apical tooth) on inner margin (number of teeth varying among individuals and on left and right legs).

Male genitalia with pygofer (figures 54, 55) in lateral view trapezoid, in caudal view circular, ventrally about 1.5 × longer than dorsally, laterodorsal edges relatively broadly produced caudad, with three small teeth subapically on dorsal margin; distance between ventral angles relatively small; median projection of ventrocaudal margin relatively long, comparatively narrow, distally with nearly U-shaped incision in ventral view (figure 58); anal tube relatively large and broad, expanded laterad mesially, lateroapical angles not produced into ventrally directed processes; anal style slender; parameres (figure 56) relatively broad, sinuous and slightly S-shaped in lateral aspect, gradually tapering from base to apex, apical part acute in lateral view; aedeagus (figure 59) with shaft elongate, slender, depressed ventrodorsally, arched in lateral aspect, with two long, slender, ventrally directed, spinose processes apically on left and dorsal side: left process long, longer than one-half total length of theca, dorsal spine base bifurcate.

Etymology. This species is named for its relatively long apical spinose processes on the aedeagus.

Material examined. Holotype ♂, **China**: Yunnan, Xishuangbanna, Menga, 1050–1080 m, 6 June 1958 (S.-Y. Wang) (IZCAS). Paratypes: **China**: 7♀, Yunnan, Xishuangbanna, Yunjinghong, 850 m, 25 June 1958 (L.-Y. Zheng) (5♀ in IZCAS; 2♀ in BMNH).

Distribution. South-west China (Yunnan). This is the first report of *Vizcaya* species from mainland China.

Remarks. This species is similar to *V. orea* but differs in having the metatibial spur with 8–11 teeth (including apical tooth) on inner margin and the aedeagus with relatively slender apical spinose processes with the left one long, longer than one-half total length of theca.

Vizcaya vindaloa Asche
(figures 8, 9, 49–51, 65–69)

Vizcaya vindaloa Asche, 1990: 174, figures 47–49.

Holotype ♀, India (BMNH) [examined].

This species was described and illustrated by Asche (1990) from a single female specimen taken at south India. An additional male and female specimen from southern India were found during this work. The male differs from the female in its smaller size (6.2 mm) and in having its first antennal segment slightly more elongate (compare figure 49 with Asche, 1990: figure 48). The second antennal segment (missing from the type described by Asche), is shown in figures 8, 9, 49.

Male genitalia with pygofer (figures 65, 66) with laterodorsal edges with one small and short tooth subapically on dorsal margin; median projection of ventrocaudal margin (figure 68) short, and relatively narrow, nearly V-shaped distally in ventral aspect; parameres (figure 65) distinctly broad subbasally, tapered to relatively broad apex; aedeagus (figure 69) with three spinose processes subapically, the longest one extending nearly to middle of shaft, a little expanded beyond middle and then

tapered to acute apex, the middle-lengthed one expanded subapically with acute apex, the shortest one acute.

Material examined. HOLOTYPE ♀, **India**: Thekkadi, Periyar Dam, Travancore, 6–10 May [19]37 [underside] B. M.-C. M. Expdn. to South India. April–May 1937; [red label] HOLOTYPE *Vizcaya vindaloa* n. sp. det. M. Asche 1990 (BMNH).

South India: 1♂, 1♀, Madras State, Anamalai Hills, Cinchona, 1067 m, May 1959 (P. S. Nathan); 1♀ [abdomen missing], Cherangode, Nilgiri Hills, 3500 ft, October 1950 (P. S. Nathan) (CAS).

Distribution. South India.

Remarks. This species is similar to another Indian species, *V. aschei* (see remarks under *aschei*).

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