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Madagascan bees of the tribe Nomioidini

(Hymenoptera, Halictidae)

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Abstract

Seven species of the tribe Nomioidini are found in Madagascar. A key to them for both sexes is given. Three species are described as new: *Ceylalicthus (Atronomioides) petiolatus* sp. nov., *C. (A.) rostratus* sp. nov., and *C. (A.) tumidus* sp. nov. *Ceylalicthus (Ceylalicthus) muiri* (COCKERELL, 1909), so far known only from Subsaharan Africa, and *C. (A.) aldabranus* (COCKERELL, 1912), so far known only from Aldabra Islands, are recorded for the first time from Madagascar; the names of both species are given in new combinations. *Nomioides variegata* var. *luederitzi* BLÜTHGEN, 1925, *N. variegata* var. *albopicta* BLÜTHGEN, 1925, and *N. variegata* var. *quinquespinosa* BLÜTHGEN, 1934, are ascertained as junior synonyms of *Ceylalicthus muiri* (COCKERELL, 1909); *Halictus personatus* BENOIST, 1962, as a junior synonym of *Ceylalicthus madagassus* (BLÜTHGEN, 1934). Lectotypes of *Nomioides variegata* var. *luederitzi* and *N. variegata* var. *albopicta* are designated.

Zusammenfassung

Es wurden sieben Arten der Tribus Nomioidini auf Madagaskar gefunden. Für sie wird ein Bestimmungsschlüssel für beide Geschlechter gegeben. Drei neue Arten werden beschrieben: *Ceylalicthus (Atronomioides) petiolatus* sp. nov., *C. (A.) rostratus* sp. nov. und *C. (A.) tumidus* sp. nov. *Ceylalicthus (Ceylalicthus) muiri* (COCKERELL, 1909), bisher nur aus dem der Sahara angrenzenden Afrika bekannt, und *C. (A.) aldabranus* (COCKERELL, 1912), nur bekannt von den Aldabra Inseln, werden erstmals aus Madagaskar gemeldet; die Namen der beiden Arten werden neu kombiniert. *Nomioides variegata* var. *luederitzi* BLÜTHGEN, 1925, *N. variegata* var. *albopicta* BLÜTHGEN, 1925 und *N. variegata* var. *quinquespinosa* BLÜTHGEN, 1934 werden als junior Synonyme von *Ceylalicthus muiri* (COCKERELL, 1909) erkannt; *Halictus personatus* BENOIST, 1962 als junior Synonym von *Ceylalicthus madagassus* (BLÜTHGEN, 1934). Lectotypen von *Nomioides variegata* var. *luederitzi* und *N. variegata* var. *albopicta* werden designiert.

Before the present study only two species of the tribe Nomioidini were known from Madagascar and neighbouring islands (PAULY 1984): "*Nomioides*" *aldabranus* (COCKERELL, 1912) and "*Nomioides*" *personatus* (BENOIST, 1962). Originally both species were described in the genus *Halictus*. "*Nomioides*" *madagassus* BLÜTHGEN, 1934, omitted by PAULY (1984), is ascertained in this paper as a senior synonym of "*Nomioides*" *personatus*.

This paper presents the results of taxonomic study of Nomioidini from Madagascar. Now the list is extended to seven species, including *Cellariella brooksi* described by me earlier (PESENKO 1993), *Ceylalictus muiri* (COCKERELL, 1909) known from Subsaharan Africa, and three new species described below (*Ceylalictus petiolatus*, *C. rostratus*, *C. tumidus*).

This study is based on examination of type materials and 328 undetermined specimens from the following museums and institutions (in brackets abbreviations used below): British Museum (Natural History), London, U. K. (BML); Institutionen för Systematisk Botanik, Uppsala Universitet, Uppsala, Sweden (IBU); Musée Royal de l'Afrique Centrale, Tervuren, Belgium (MACT); Museum of Comparative Zoology, Harvard University, Cambridge, U. S. A. (MCZC); Museum für Naturkunde, Humboldt Universität, Berlin, Germany (MNB); Naturhistorisches Museum, Basel, Switzerland (NMB); Rijksmuseum van Natuurlijke Histoire, Leiden, The Netherlands (RNL); Snow Museum, University of Kansas, Lawrence, U. S. A. (UKL); National Museum of Natural History, Smithsonian Institution, Washington, U. S. A. (USMW); Utah State University, Logan, U. S. A. (UUL); Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (ZISP).

The Madagascan fauna of Nomioidini includes only one species (*Ceylalictus muiri*) shared with the African fauna. The other six species are endemics of Madagascar. Five of the seven Madagascan species of Nomioidini belong to the subgenus *Atronomioides* of the genus *Ceylalictus*. This subgenus is represented outside Madagascar also by only five species: *C. (A.) halictoides* (BLÜTHGEN, 1925) in Equatorial and South Africa, *C. (A.) warnckeii* PESENKO, 1983 in south-western Iran, *C. (A.) hainanicus* PESENKO et WU, 1991 in Hainan Island (South China), and two species in the East of the Oriental region. The genus *Nomioides* dominating in the Palearctic and Afrotropical faunas is not found in Madagascar.

Scale lines in the lower part of plates are as follows: the upper one - 0.5 mm for figures of heads, antennae, and wings; 0.25 mm for figures of metasomal sterna 7 and 8 and male genitalia; the lower one - 1.0 mm for figures of mesosomas and metasomas.

Acknowledgements

I am grateful to the following curators of collections for sending me types for study and materials for identification: Mr George R. ELSE (BML), Dr E. DE CONINCK (MACT), Dr L. ANDERS NILSSON (IBU), Dr James CARPENTER and Dr Scott R. SHAW (MCZC), Dr Frank KOCH and Mrs Ingrid WEGENER (MNB), Dr M. BRANCUCCI (NMB), Dr R. HENSEN (RNL), Prof. Charles D. MICHENER and Dr Robert W. BROOKS (UKL), Dr Ronald J. MCGINLEY (USMW), Dr Terry L. GRISWOLD (UUL).

**Key to the Madagascan genera, subgenera,
and species of Nomioidini**

- 1 Both sexes: first metasomal tergum with large yellow or whitish yellow integumental median transverse spot (Figs. 4, 5); second submarginal cell of forewing petiolate (Fig. 3); body almost uniformly granulate, dull. - Male: middle segments of antennae shorter than their diameters (Fig. 1); penis valves strongly triangularly broadened distally (Figs. 6, 7). - Female: inner metatibial spurs with one tooth (Fig. 2). (Genus *Cellariella* STRAND, 1926).
..... 1. *Cellariella brooksi* PESENKO, 1993
- Both sexes: first metasomal tergum without such spot, sometimes with narrow pale band along hind margin (Figs. 21, 34, 69), with lateral spots (Fig. 13), or without pale markings (Figs. 12, 30, 42, 47, 56, 64); second submarginal cell of forewing trapezoidal (Figs. 10, 29, 41, 54, 67) or triangular (Figs. 20, 33, 68) (excepting *Ceylalictus petiolatus*, Fig. 46); body, at least partly, shiny or dully shiny. - Male: middle segments of antennae as long as their diameters (Figs. 32, 53, 66) or longer (Figs. 8, 19, 45); penis valves not broadened distally (Figs. 15, 16, 24, 25, 37, 38, 50, 51, 59, 60, 72, 73). - Female: inner metatibial spurs pectinate, with 2-4 teeth (Figs. 9, 28, 40, 63, 75). (Genus *Ceylalictus* STRAND, 1913). 2
- 2 Both sexes: dull green or dark blue, with metallic tint. - Male: mandibles without subapical tooth; metasomal tergum 6 strongly narrowed apically (Fig. 12); sternum 8 without apical lobe (Fig. 14); genital foramen rounded; gonostyli narrow, subapically curved mesally (Figs. 15, 16). - Female: scutum with yellow integumental median transverse spot before hind margin (Fig. 11); inner metatibial spurs with two teeth (Fig. 9). (Subgenus *Ceylalictus*).
..... 2. *Ceylalictus (Ceylalictus) muiri* (COCKERELL, 1909)
- Both sexes: black, without metallic tint (slight tint is possible in *C. petiolatus*). - Male: mandibles with subapical tooth; metasomal tergum 6 weakly narrowed apically (Fig. 21, 34, 47, 56, 69); sternum 8 with short apical lobe (Figs. 23, 36, 49, 58, 71); genital foramen longitudinal; gonostyli not narrowed or not curved mesally (Figs. 24, 25, 37, 38, 50, 51, 59, 60, 72, 73). - Female: scutum without pale markings; inner metatibial spurs with three or four teeth (Figs. 28, 40, 63, 75). (Subgenus *Atronomioides* PESENKO, 1983). 3
- 3 Both sexes: horizontal surface of propodeum longer than scutellum, forming with posterior vertical surface a distinct angle of 105°; scutellum almost flat; second submarginal cell of forewing petiolate (Fig. 46); upper part of genal areas sparsely

punctate, shiny; wing veins and stigmatae pale yellow. - Male: scapi yellow on anterior surface; flagomeres 3-5 long, their length / diameter ratios 2 (Fig. 45); ventral gonobasal bridge almost level with gonocoxal bridge; gonostyli on inner margin with hairy process and series of long hairs directed mesally (Figs. 50, 51). - Female unknown.

..... 5. *Ceylalictus (Atronomioides) petiolatus* PESENKO sp. nov.

- Both sexes: horizontal surface of propodeum as long as scutellum or shorter, forming with posterior vertical surface a rounded angle of 135°; scutellum convex; second submarginal cell of forewing trapezoidal (Figs. 29, 41, 54, 67) or triangular (Figs. 20, 33, 68); upper part of genal areas rugoso-striate, dull; wing veins and stigmatae yellowish brown to dark brown. - Male: scapi black; flagomeres 3-5 shorter, their length / diameter ratios 1.0 - 1.4 (Figs. 19, 32, 53, 66); ventral gonobasal bridge behind ventral gonocoxal bridge; gonostyli on inner margin without process and such hairs (Figs. 24, 25, 37, 38, 59, 60, 72, 73). 4

- 4 Both sexes: wing membranes and tegulae infuscated; metasomal terga 2-3 or 2-4 (in holotype of *C. aldabranus*) with narrowed or interrupted pale integumental band on postgradular areas (Figs. 21, 30, 34, 42); supraclypeal area strongly convex; posterior vertical surface of propodeum dull, scabrose (except upper third of surface in *C. aldabranus*). - Male: paraocular area in notch of inner orbit distinctly projected as shiny tubercle; flagomeres 3-5 longer than their diameters (Figs. 19, 32); face without plumose addressed pubescence. 5

- Both sexes: wing membranes and tegulae hyaline or slightly infuscated; metasomal terga 2-5 with broad continuous pale band on postgradular areas (Figs. 56, 64, 69, 76); supraclypeal area weakly convex; posterior vertical surface of propodeum shiny, sparsely punctate (in males) or weakly granulate (in females). - Male: paraocular area in notch of inner orbit weakly convex; flagomeres 3-5 as long as their diameters (Figs. 53, 66); face with white plumose addressed pubescence. 6

- 5 Both sexes: smaller, length of body 4.2 - 4.7 mm; pubescence of head and mesosoma white; metapostnotum ("median or triangular area of propodeum") not distinctly defined laterally and posteriorly; postgradular areas of metasomal terga 2-4 strongly convex; clypeus dull; scutellum sparsely punctate; lower surface of flagellum dark brown. - Male: metasomal terga 1-3 smooth, with obscure and sparse punctation; posterior margin of sternum 7 with triangular median projection

(Fig. 22); apical lobe of sternum 8 shaped like triangular star (Fig. 23); ventral gonobasal bridge narrowed; gonostyli boot-shaped, with basal carina on dorsal surface, hairless (Figs. 24, 25). - Female: longitudinal carina between antennal sockets indistinct; inner hind tibial spurs with three teeth (Fig. 28).

..... 3. *Ceylalicthus (Atronomioides) aldabranus* (COCKERELL, 1912)

- Both sexes: larger, length of body 5.7 - 6.0 mm; pubescence on upper half of face, vertex, scutum, scutellum, and metanotum dark brown; metapostnotum well defined; postgradular areas of metasomal terga 2-4 weakly convex; clypeus shiny; scutellum densely punctate; lower surface of flagellum pale yellowish to ochre-brown. - Male: metasomal terga 1-3 dull, densely granulate; posterior margin of sternum 7 with rounded median projection (Fig. 35); apical lobe of sternum 8 triangular (Fig. 36); ventral gonobasal bridge rhomboidal; gonostyli shaped like high trapezium, without basal carina, but with several hairs on apical part of dorsal surface (Figs. 37, 38). - Female: longitudinal carina between antennal sockets distinct; inner hind tibial spurs with four teeth (Fig. 40).

..... 4. *Ceylalicthus (Atronomioides) madagassus* (BLÜTHGEN, 1934)

- 6 Both sexes: head egg-shaped in frontal view; its height / width ratio 1.2 - 1.25 in male (Fig. 52) and 1.1 - 1.15 in female (Fig. 61); clypeus stronger projecting below lower margin of eyes: 0.7 of its height in male and 0.8 in female; malar space 0.2 - 0.3 of the width of mandibular base; dorsal surface of propodeum 1.35 - 1.4 times shorter than scutellum. - Male: scutum dull, granulate; postgradular areas of metasomal terga 2-4 strongly convex (Fig. 56); ventral gonobasal bridge broadened (Fig. 59). - Female: inner metatibial spurs with four long teeth (Fig. 63); pubescence of vertex and dorsal surface of mesosoma partly dark.

..... 6. *Ceylalicthus (Atronomioides) rostratus* PESENKO, sp. nov.

- Both sexes: head rounded in frontal view; its height / width ratio 0.95 - 1.0 (Figs. 65, 74); clypeus less projecting below lower margin of eyes: 0.5 of its height in male and 0.6 in female; malar space linear; dorsal surface of propodeum 1.2 times shorter than scutellum. - Male: scutum shiny, sparsely punctate; postgradular areas of metasomal terga 2-4 weakly convex; ventral gonobasal bridge narrowed (Fig. 72). - Female: inner metatibial spurs with three long teeth (Fig. 75); body without dark hairs.

..... 7. *Ceylalicthus (Atronomioides) tumidus* PESENKO, sp. nov.

1. *Cellariella brooksi* PESENKO, 1993 (Figs. 1-7)

Cellariella brooksi PESENKO, 1993: 3, Figs. 1-5, 7, 8, 10, 12, 14, 15, 17, 19, 21. ♂, ♀. Holotype: ♂, "Beza Mahafaly Reserve, Tulear Province, 14.xi.1984, Malaise trap, no. 142, R. W. BROOKS", UKL.

Distribution: Madagascar.

Material examined (148 ex., including 120 paratypes; BML, RNL, UKL, UUL, ZISP). Antananarivo Province: Antananarivo, Parc de Tsimbazaza, 28.xi.1984, W. BROOKS, 1 ♂. Toliara Province: Beza Mahafaly Res., 15-23.xi.1984, R. BROOKS, 54 ♂♂, 40 ♀♀; same locality, 9.ii.1985, J. WENZEL, 8 ♂♂, 14 ♀♀; Toliara, 24.xi.1984, W. BROOKS, 1 ♀; 30 km S Toliara, 28.xi.1986, J. WENZEL, 9 ♂♂, 9 ♀♀; 5 km E Ambonimahavelona, 30.xi.1986, J. WENZEL, 7 ♂♂; Ankilibe, 22.iv.1984, R. HENSEN & A. APTROOT, 1 ♂, 3 ♀♀; Tongobory, 27.iii.1968, K. GUICHARD, 1 ♂.

2. *Ceylalicthus (Ceylalicthus) muiri* (COCKERELL, 1909) (Figs. 8-16)

Nomioides muiri COCKERELL, 1909: 400. ♀. Holotype (not examined): ♀, "Hab. Mozambique (F. MUIR). Type in Cambridge University Museum", ?lost - it was found neither in MCZC (personal communication by Dr. Scott R. SHAW in his letter of 19.v.1986), nor in USMW (personal communication by Dr. Ronald J. MCGINLEY in his letter of 13.xii.1995).

BLÜTHGEN 1925: 51 (*N. variegata* var. *muiri*); COCKERELL 1932: 1 (♂); BLÜTHGEN 1934: 257 (*N. variegata* var. *muiri*); IRELAND 1935: 107, fig. 37; ALFKEN 1939: 112 (*N. variegata* var. *muiri*); COCKERELL 1939: 179; PESENKO 1983: 108 (*Ceylalicthus muiri*).

Nomioides variegata var. *albopicta* BLÜTHGEN, 1925: 53. ♂. Lectotype (designated here): ♂, "Nyassa-See Langenburg [Tanzania] 1-9.vi.[18]98 FÜLLEBORN S." (the nearest specimen to the pin of two ones glued on the same paper piece), MNB. Syn. nov.

Nomioides variegata var. *luederitzi* BLÜTHGEN, 1925: 54. ♂. Lectotype (designated here): ♂, "S. W. Afrika Rooibank [Namibia] v.1905 N. 1136", MNB. Syn. nov.

IRELAND 1935: 98, fig. 36 (*N. luederitzi*); COCKERELL 1939: 179.

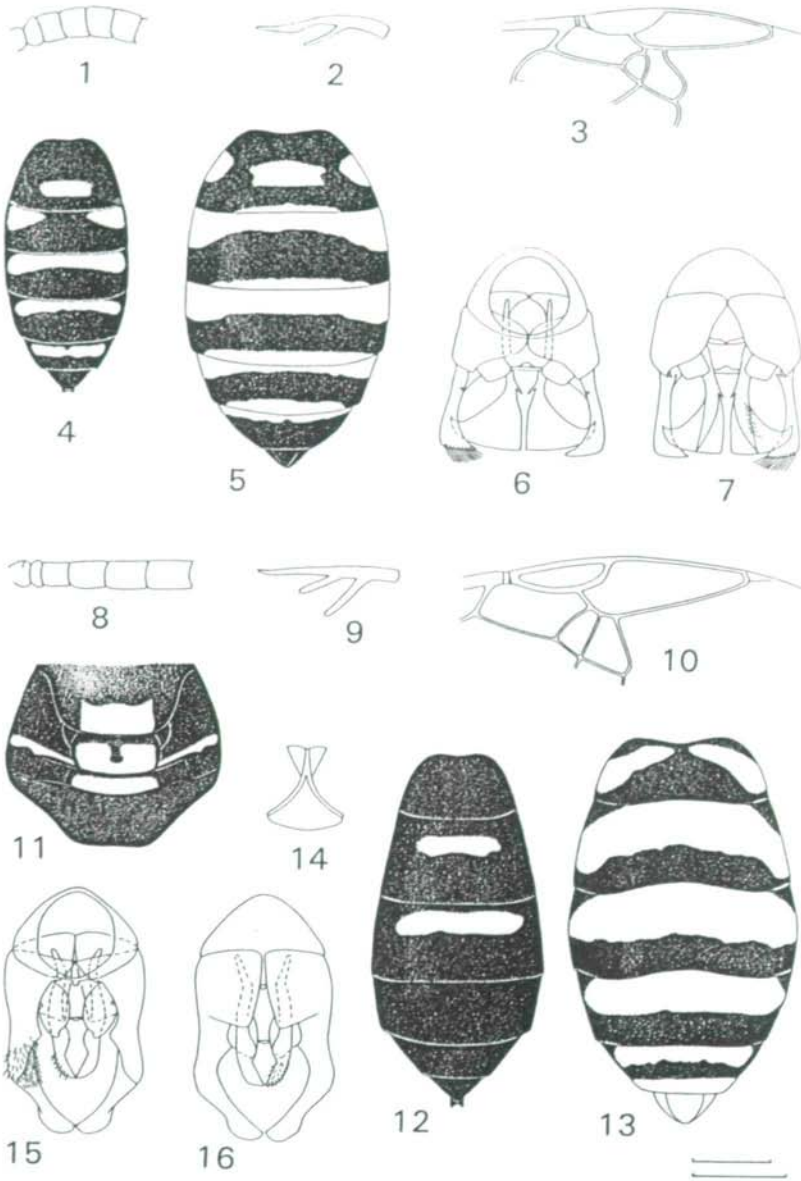
Nomioides variegata var. *quinquefasciata* BLÜTHGEN, 1934: 257. ♂. Holotype (examined): ♂, "S. W. Africa Okahandja 19-29.xii.1927 R. E. TURNER", BML. Syn. nov.

Distribution: Sub-Saharan Africa, new for Madagascar.

Material (from Madagascar) examined (142 ex.; BML, IBU, MACT, RNL, UKL, ZISP). Mahajanga Province: Majunga, Ankarafantsika Forest Station, 21-22.xi.1986, J. WENZEL, 12 ♂♂, 16 ♀♀; 2 km E. Mahajanga, 23.xi.1986, J. WENZEL, 4 ♂♂, 59 ♀♀; Ankarafantsika, Amoljoroa, 22.xi.1986, L. NILSSON & B. PETTERSSON, 1 ♀. Manahara Province: 6 km N. Tamatave, 15.i.1985, J. WENZEL, 1 ♀; Maroantsetra, 26.v.1984, R. HENSEN & A. APTROOT, 2 ♂♂; Tamatave, 19.v.1984, R. HENSEN & A. APTROOT, 1 ♀; Soanlerana Ivongo, N. RANTABE, 29.x.1986, L. NILSSON & B. PETTERSSON, 6 ♂♂, 4 ♀♀. Toliara Province: Beza Mahafaly Res., 15.xi.1984, R. BROOKS, 1 ♂; Berenty, 28.ii.1985, J. WENZEL, 2 ♂♂, 3 ♀♀; 30 km S. Toliara, 28.xi.1986, J. WENZEL, 2 ♂♂, 1 ♀; 45 km S. Mahabo, 24-26.xi.1986, J. WENZEL, 1 ♀; Ankilibe, 22.iv.1984, R. HENSEN & A. APTROOT, 1 ♂; Betioky, 5.iv.1968, K. GUICHARD, 1 ♂; Bevilary, 12.iv.1968, K. GUICHARD, 2 ♂♂; Tongobory, 27.iii.1968, K. GUICHARD, 2 ♂♂; St. Augustin, 29.iii.1968, K. GUICHARD, 1 ♂; Zombitsy Forest, 22.iii.1968, K. GUICHARD, 5 ♂♂; Behara, iv.1937, A. SEYRIG, 12 ♂♂, 2 ♀♀.

Figs. 1-16. *Cellariella brooksi* (1-7) and *Ceylalicthus (Ceylalicthus) muiri* (8-16):

1, 8 - flagomeres 1-5 of males; 2, 9 - inner metatibial spurs of females; 3, 10 - part of forewings; 11 - part of mesosoma of female (dorsal view); 4, 12 - metasomas of males; 5, 13 - metasomas of females; 14 - metasomal sternum 8 of male; 6, 7, 15, 16 - genitalia of males (6, 15 - ventral view; 7, 16 - dorsal view).



3. *Ceylalicthus (Atronomioides) aldabranus* (COCKERELL, 1912) comb. nov.
(Figs. 17-30)

Halictus aldabranus COCKERELL, 1912: 31. ♂. Holotype: ♂, "Aldabra, '08-9. J.C.F. FRYER", "312" [Espirit Island, 27.xii], "B.M. Type Hym. 17.a.767", "*Halictus aldabranus* KLL. Type" [by COCKERELL's hand], "Seychelles Exped. Pres. by Committee of the Percy SLADEN Trust Fund. 1911 - 43", BML (examined).

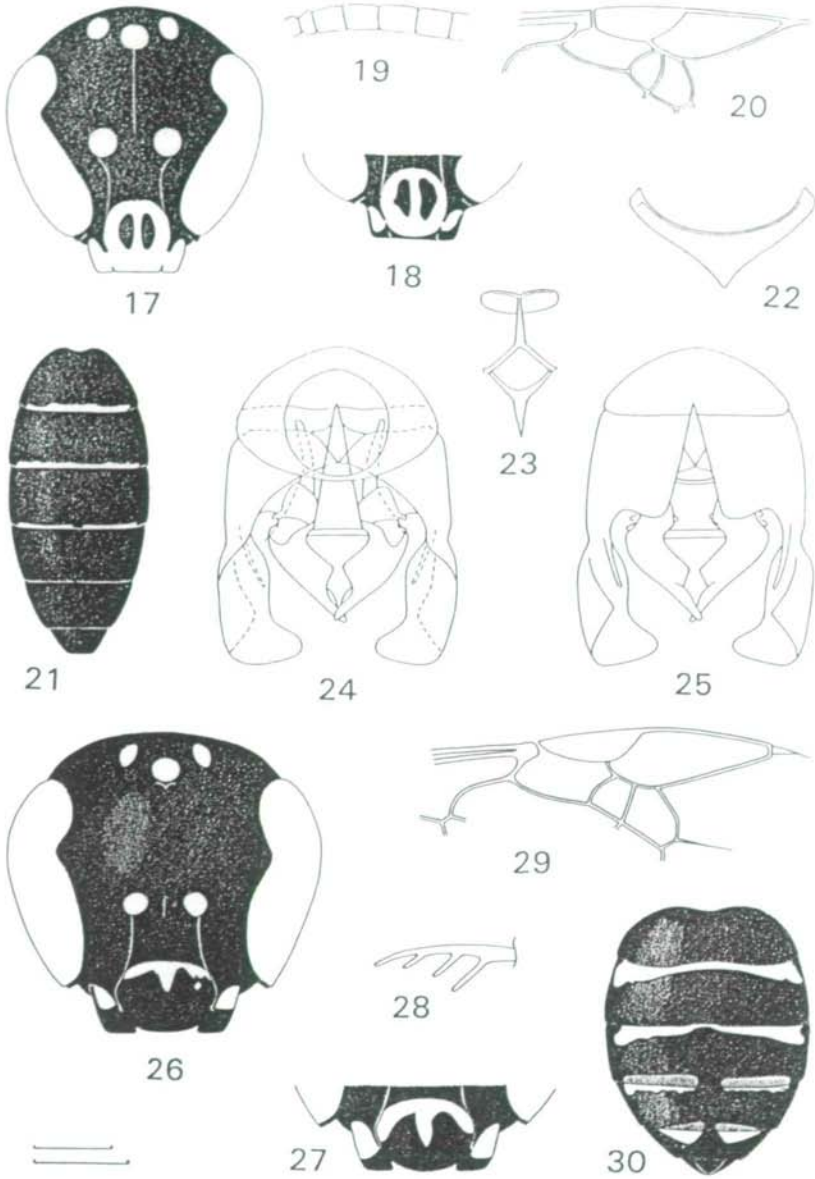
BLÜTHGEN 1932: 31 (*Nomioides aldabrana*); BLÜTHGEN 1934: 278 (*N. aldabrana*, redescription); COCKERELL 1935: 90 (*N. (Cellariella) aldabrana*); PESENKO 1983: 108 (*N. aldabranus*); PAULY 1984: 145 (*N. aldabrana*).

Female (nov.): Structure. Length 4.6 - 4.7 mm. Head flattened, triangularly rounded in frontal view; as high as wide (Fig. 26). Medial clypeal lobe flattened; its height / width ratio 0.7. Clypeus projecting 0.6 of its height below lower margin of eyes. Supraclypeal area convex. Malar space linear. Inner orbits with not deep, triangularly rounded notch; its depth about 0.3 of maximal (extrapolated) ocular width in frontal view (Fig. 26); paraocular area in the notch weakly convex. Longitudinal carina between antennal sockets inconspicuous. Frontal line absent. Scutellum convex. Metapostnotum bordered laterally by weak elevation and marked by change of sculpture, crescent-shaped, weakly impressed transversely. Horizontal surface of propodeum 1.2 times shorter than scutellum, forming with posterior vertical surface a rounded angle of about 135°. Inner metatibial spurs with three teeth (Fig. 28). Marginal cell of forewing relatively long, narrowly truncated at distal end; second submarginal cell trapezoidal (Fig. 29). Hind wings with six distal hamuli on anterior margin. Metasoma weakly convex, elliptically heart-shaped (Fig. 30). Posterior marginal areas of terga flattened, defined medially only in terga 1 and 2.

Sculpture. Clypeus shagreened, dull throughout or weakly shiny on lower part, with superficial pits 21-35 separated by 0.3 - 1.5 times of their diameters. Supraclypeal area shagreened, with three to five punctures about 14, weakly shiny. Frons and vertex silk-dull, finely and obscurely granuloso-punctate. Genal areas silk-dull, longitudinally finely and densely rugulose almost throughout. Scutum dull and densely granulate (each granula about 0.5 of eye facet) on anterior half or two thirds, posteriorly becoming shiny and irregularly punctate: punctures 14-21 separated by 0.3 - 1.5 times of their diameters. Scutellum polished, with fine and sparse punctures 7 separated by 1-5 times of their diameters. Metapostnotum dull, with fine and dense striae fan-shapedly dispersing backwards on its anterior half, finely granulate on its posterior half. Mes- and metepisterna and lateral surfaces of propodeum dull, finely and densely granulate. Posterior vertical surface of propodeum weakly shiny, rugulose and obscurely punctate, with polished triangle under upper margin medially. Terga 1 and 2 dull, densely granulate, each granula equal to eye facet; sculpture of succeeding terga progressively more obscure, terga becoming shiny.

Figs. 17-30. *Ceylalicthus (Atronomioides) aldabranus*, male

(17-25; holotype, excepting fig. 18) and female (26-30): 17, 26 - heads (frontal view); 18, 27 - lower part of heads of other specimens; 19 - flagomeres 1-5; 28 - inner metatibial spur; 20, 29 - part of forewings; 21, 30 - metasomas; 22 - metasomal sternum 7; 23 - metasomal sternum 8; 24, 25 - genitalia (24 - ventral view, 25 - dorsal view).



Coloration. Black without metallic tints. The following parts whitish yellow: T-shaped figure on upper part of medial clypeal lobe; upper half or two thirds of lateral clypeal lobes (Fig. 26, 27); interrupted medially band on collar of pronotum; posterior lobes of pronotum; spot on anterior part of tegulae; bases of wings; scutellar crests; median metanotal area; proximal end of fore and middle tibiae on external surface; narrow transverse bands on pregradular areas of metasomal terga 2-4, two latest ones interrupted medially (Fig. 30). Scapi and pedicels black; flagella black on upper surface and dark brown on lower surface. Wing membranes and tegulae infuscated; veins and stigmatae dark brown.

Vestiture. White, short, not dense, erect, slightly plumose; plumose adpressed hairs absent.

Distribution: Aldabra Islands, new for Madagascar.

Material examined (8 ex.). Aldabra Islands: Espirit Island, 27.xii.1908, J. FRYER, 1 ♂ (Holotype, BML). Mahajanga Province: Ankarafantsika, Amoljoroa, 17-27.xi.1986, L. NILSSON & B. PETTERSSON, 2 ♂♂, 3 ♀♀ (IBU, ZISP). Manahara Province: Soanlerana Ivongo, N. Rantabe, 28-29.x.1986, L. NILSSON & B. PETTERSSON, 1 ♂, 1 ♀ (IBU).

4. *Ceylalictus (Atronomioides) madagassus* (BLÜTHGEN, 1934) comb. nov.

(Figs. 31-42)

Nomioides madagassa BLÜTHGEN, 1934: 278, fig. 23. ♀. Holotype (not examined): ♀, "Madagascar, Zentral-Plateau, Antsirabe, 1000-1500 m, 27.ix.[19]28, A. SEYRIG, in den Sammlungen von Dr. H. HEDICKE in Berlin", lost - it was not found in MNB (personal communication by Dr. Frank KOCH in his letter of 6.vi.1986). Evidently, the holotype was not handled by H. HEDICKE to MNB and was destroyed (together with that part of his collection which was retained at his home) by a bomb explosion in 1943 (KÖNIGSMANN 1971: 392). I examined the single specimen of this species in MNB - a paratype with the same label.

PESENKO 1983: 108 (*N. madagassus*).

Halictus personatus BENOIST, 1962: 108. ♂. Holotype : ♂, "Madagascar, Tan. Ambatolampy, 1.i.[19]58, F. KEISER", "ohne Kopf zurück", NMB (examined). Syn. nov.

PAULY 1984: 145 (*Nomioides personata*).

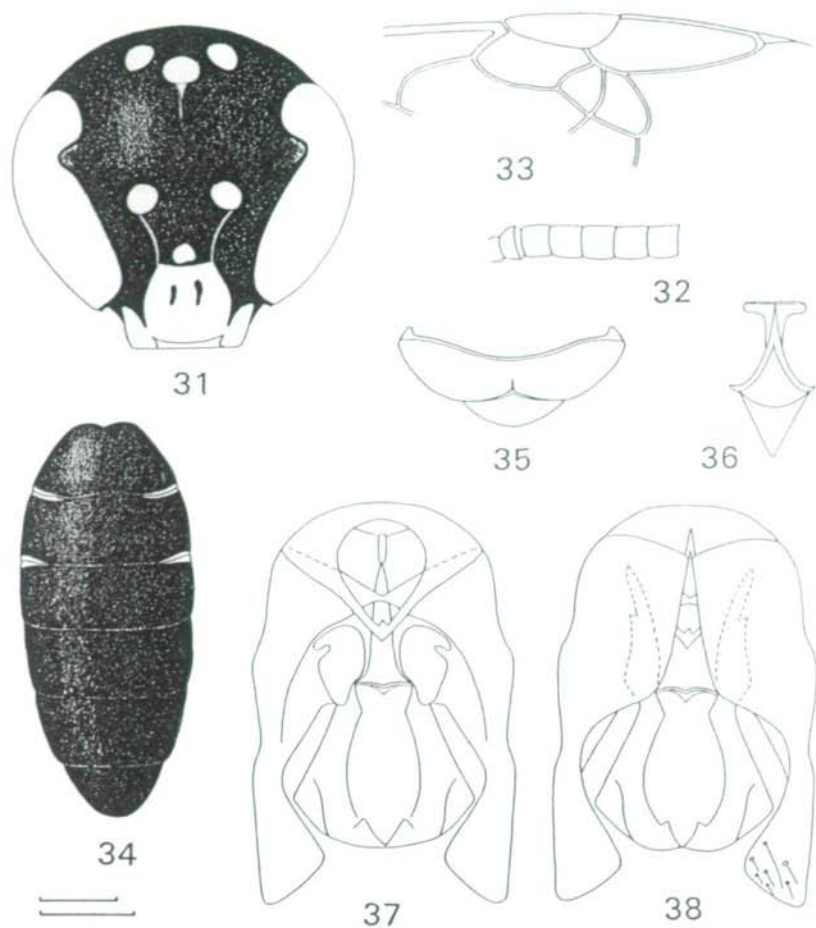
Distribution: Madagascar.

Material examined (5 ex.). Antananarivo Province: Antsirabe, 27.ix.1928, A. SEYRIG, 1 ♀ (paratype of *Nomioides madagassus*, MNB); Ambatolampy, 1.i.1958, F. KEISER, 2 ♂♂ (holotype and paratype of *Halictus personatus*, NMB); Ankazobe Amlochitately, 17.xi.1983, L. NILSSON & L. JONSSON, 1 ♂ (IBU); Angavokely Mt., 15.iii.1985, L. NILSSON, 1 ♀ (IBU).

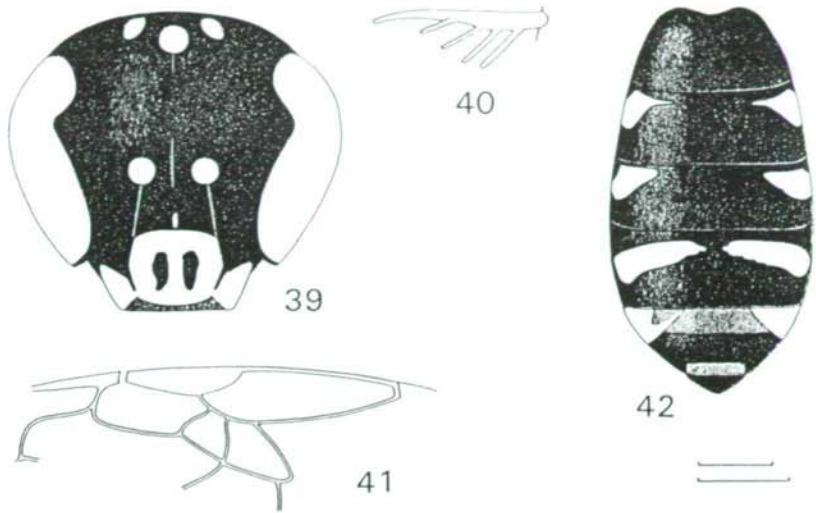
5. *Ceylalictus (Atronomioides) petiolatus* PESENKO sp. nov. (Figs. 43-51)

A diagnose is given in the key to the Madagascan species above.

Male: Structure. Length 4.3 mm. Head flattened, rounded in frontal view; its height / width ratio 0.92 (in paratype) - 0.95 (in holotype, Fig. 43). Medial clypeal lobe flattened; its height / width ratio 0.65 (in holotype, Fig. 43) - 0.75 (in paratype, Fig. 44). Clypeus projecting 0.5 of its height below lower margin of eyes. Face strongly impressed above, below and laterally of antennal sockets. Supraclypeal area flattened, before its upper border with weak transverse tubercle. Malar space linear. Inner orbits with relatively deep, triangularly rounded notch; its depth about 0.5 of maximal (extrapolated) ocular width in frontal view (Fig. 43); paraocular area in the notch distinctly convex. Litudinal carina between antennal sockets absent. Frontal line developed. Mandibles with subapical dens. Antennae elongate, reaching the middle of metasomal



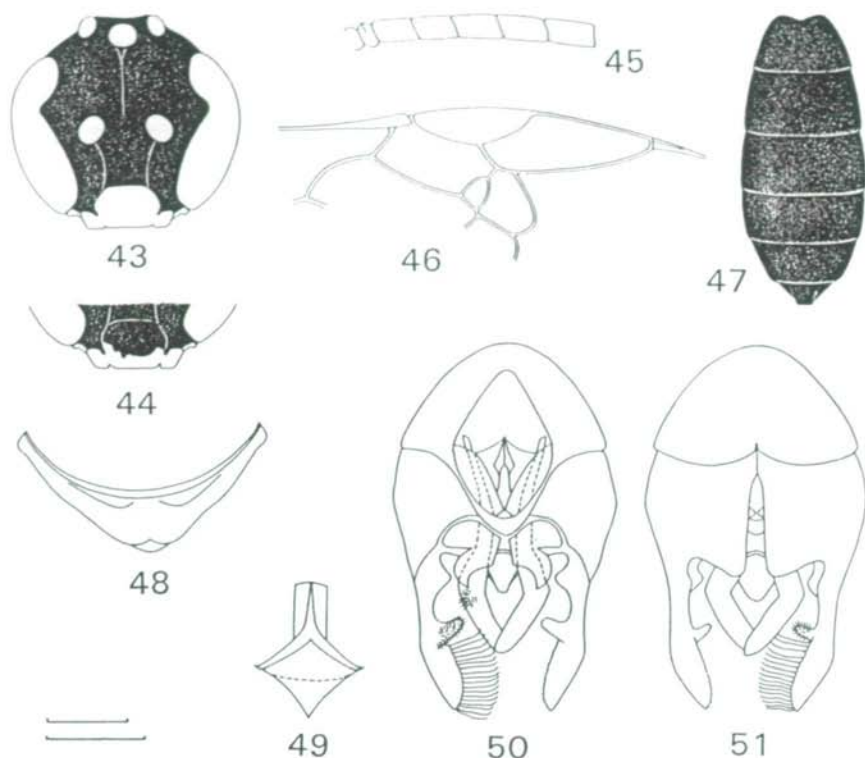
Figs. 31-38. *Ceylalicthus (Atronomioides) madagassus*, male
(32-34 - holotype of *Halictus personatus*; 31, 35-38 - paratype of *H. personatus*): 31 - head (frontal view); 32 - flagomeres 1-5; 33 - part of forewing; 34 - metasoma; 35 - metasomal sternum 7; 36 - metasomal sternum 8; 37, 38 - genitalia (37 - ventral view, 38 - dorsal view).



Figs. 39-42. *Ceylacticus (Atronomioides) madagassus*, female (paratype):
39 - head (frontal view); 40 - inner metatibial spur; 41 - part of forewing; 42 - metasoma.

terga 1. First flagomere 3 times shorter than second one. Second flagomere as long as third one and slightly shorter than subsequent ones, their length / diameter ratios 2 (Fig. 45). Scutellum weakly convex. Metapostnotum not defined laterally. Horizontal surface of propodeum flat, 1.3 times longer than scutellum, forming with posterior vertical surface a distinct angle of about 105° . Marginal cell of forewing narrowly rounded at distal end; second submarginal cell petiolate (Fig. 46). Hind wings with seven distal hamuli on anterior margin. Metasoma flattened, inversely lanceolate; metasomal tergum 6 enlarged, truncated at posterior end (Fig. 47). Postgradular areas of terga flattened. Posterior marginal areas of terga flattened, narrowed, not defined medially. Posterior margins of metasomal sterna 4 and 5 straight. Sternum 7 usual, without dentes or process on its posterior margin (Fig. 48). Apical lobe of sternum 8 shortened, triangular (Fig. 49). Genital foramen longitudinal, elliptico-rhomboidal; median gonobasal suture absent; posterior margin of gonobase widely bilobed on dorsal surface; ventral gonobasal bridge broadened medially, arched, almost level with ventral gonocoxal bridge; gonostyli narrow, on inner margin with hairy process and series of long hairs directed mesally; penis valves relatively narrow, curved (Figs. 50, 51).

Sculpture. Clypeus weakly shiny (in holotype) or shiny (in paratype), with not dense, variable punctation. Supraclypeal area dully shiny (in holotype) or shiny (in paratype). Frons and vertex dully shiny, densely and finely granulate. Genal areas not densely and indistinctly punctate on upper part behind eyes, finely and sparsely granuloso-shagreened on lower part. Scutum silk-shiny, uniformly finely and densely granuloso-punctate,



Figs. 43-51. *Ceylalictus (Atronomioides) petiolatus*, male

(43, 45-47 - holotype; 44, 48-51 - paratype): 43 - head (frontal view); 44 - lower part of head; 45 - flagomeres 1-5; 46 - part of forewing; 47 - metasoma; 48 - metasomal sternum 7; 49 - metasomal sternum 8; 50, 51 - genitalia (50 - ventral view, 51 - dorsal view).

each granula equal to eye facet. Horizontal surface of propodeum (including not defined metapostnotum) shiny, weakly alveolo-granulate with transverse arrangement of granulae, laterally becoming dull and more finely granulate, similar to lateral surfaces. Mes- and metepisterna dull, finely granulate. Metasoma moderately shiny; terga 1 and 2 very obscurely granulate; their posterior marginal areas and succeeding terga obscurely and very finely transversely striate.

Coloration. Black, without metallic tints (in holotype) or with very slight blue tint on head and mesosoma (in paratype). Pale integumental markings relatively poor. The following parts yellow: labrum; clypeus throughout (in holotype, Fig. 43) or only its lower part (in paratype, Fig. 44); mandibles (except orange apices); lower surface of scapi, collar laterally (only in holotype) and posterior lobes of pronotum (partly in paratype); basal strip and anterior spot on tegulae; bases of wings; fore femora on distal

fourth; fore tibiae; middle and hind tibiae on proximal and distal ends; tarsi. Flagella pale ochre-brown on lower surface, dark brown on upper surface. Wing membranes and tegulae hyaline; veins and stigmatae pale yellow, except orange-brown veins forming the marginal cells and stigmatae. Posterior marginal areas of metasomal terga brownish translucent.

Vestiture. White, not dense, erect, slightly plumose. Face on lower two thirds and genal areas covered by white, not dense, short, plumose, adpressed hairs.

Female unknown.

Holotype: ♂, "Madagascar, Tulear [Toliara] Pr[ovince], Betioky, 275 m, 5.iv.1968, K.M. G[UICHARD] & P. D.", BML.

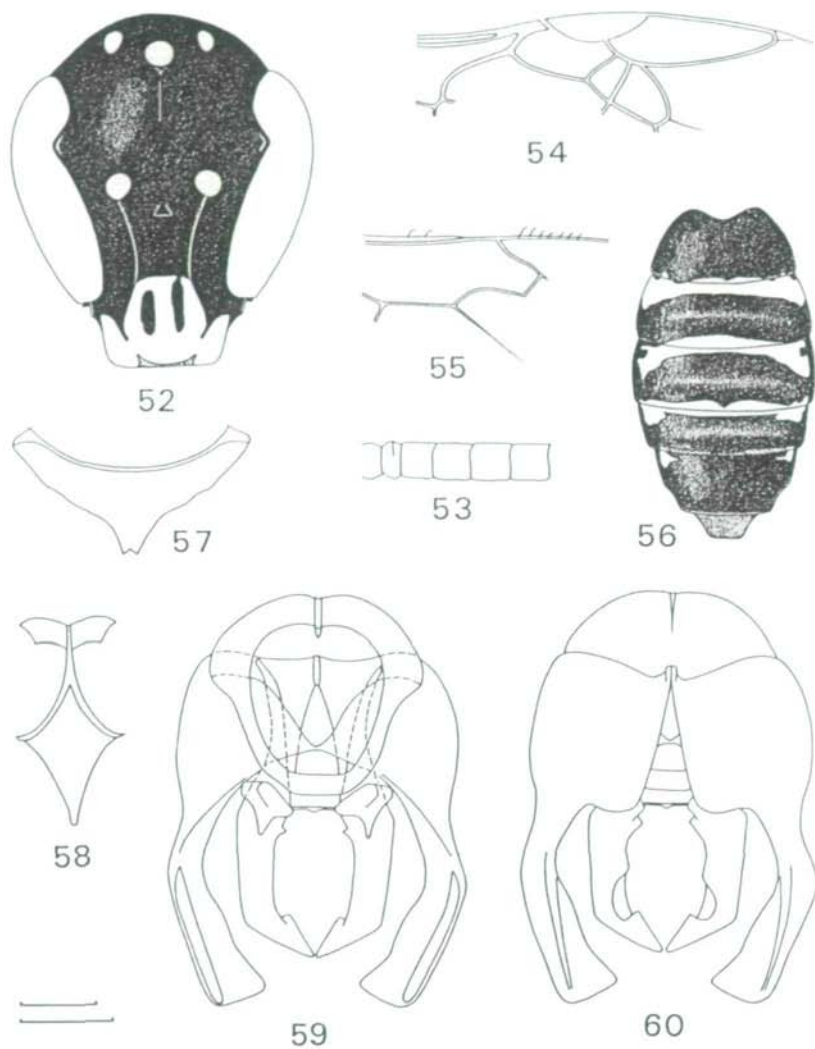
Paratype: "Madagascar, Tulear [Toliara] Pr[ovince], Tongobory, 200 m, 27.iii.1968, K.M. G[UICHARD] & P. D.", 1 ♂, ZISP.

6. *Ceylacticus (Atronomioides) rostratus* PESENKO sp. nov. (Figs. 52-64)

A diagnose is given in the key to the Madagascan species above.

Male: Structure. Length 4.6 - 5.0 mm. Head flattened, elongately egg-shaped in frontal view; its height / width ratio 1.2 - 1.25 (Fig. 52). Face broadly impressed on level of antennal sockets. Ocellar elevation distinct. Medial clypeal lobe weakly and uniformly convex; its height / width ratio 1.15 - 1.2. Clypeus projecting 0.75 of its height below lower margin of eyes. Supraclypeal area weakly convex, before its upper border with small triangular tubercle. Malar space developed, 0.25 - 0.3 of the width of mandibular base. Inner orbits with relatively deep triangular notch; its depth about 0.3 of maximal (extrapolated) ocular width in frontal view (Fig. 52); paraocular area in the notch weakly convex. Litudinal carina between antennal sockets absent. Frontal line indistinct. Mandibles with subapical dens. Antennae relatively short, reaching the metanotum. First flagomere twice shorter than second one; second flagomere 1.2 times shorter than subsequent ones, its length / diameter ratio 0.8; flagomeres 3-5 as long as their diameters (Fig. 53). Scutellum convex. Metapostnotum bordered laterally and posteriorly by indistinct change of sculpture and weak elevation, crescent-shaped, weakly impressed. Horizontal surface of propodeum 1.4 times shorter than scutellum, forming with posterior vertical surface a rounded angle of about 135°. Marginal cell of forewing relatively narrow, narrowly truncated at distal end; second submarginal cell trapezoidal (Fig. 54). Hind wings with seven distal hamuli on anterior margin (Fig. 55). Metasoma convex, elongately elliptical; metasomal tergum 6 enlarged, broadly truncated at posterior end (Fig. 56). Postgradular areas of terga 2-4 strongly convex. Posterior marginal areas of terga narrowed, flattened, distinctly separated from postgradular areas. Posterior margins of metasomal sterna 4 and 5 straight. Posterior margin of metasomal sternum 7 strongly protuberant medially, with small triangular notch at end (Fig. 57). Apical lobe of sternum 8 shaped like sharp triangle (Fig. 58). Genital foramen longitudinal, rectangularly elliptical; median gonobasal suture present partly; posterior margin of gonobase bow-shaped on dorsal surface; ventral gonobasal bridge moderately broadened, situated behind ventral gonocoxal bridge; gonostyli weakly broadened apically, relatively simple, hairless; penis valves moderately broadened, straight, except apical part curved mesally (Figs. 59, 60).

Sculpture. Clypeus silk-shiny, uniformly densely and finely punctate: elongate punctures 14 divided by 0.3 - 0.5 times of their widths; interspaces polished. Supraclypeal area dull, granuloso-shagreened, but on central part, which weakly shiny, with obscure punctation. Frons dull, densely granulate. Vertex weakly shiny, obscurely



Figs. 52-60. *Ceylalictus (Atronomioides) rostratus*, male
(52-56 - holotype; 57-60 - paratype): 52 - head (frontal view); 53 - flagomeres 1-5;
54 - part of forewing; 55 - part of hind wing; 56 - metasoma; 57 - metasomal sternum 7;
58 - metasomal sternum 8; 59, 60 - genitalia (59 - ventral view, 60 - dorsal view).

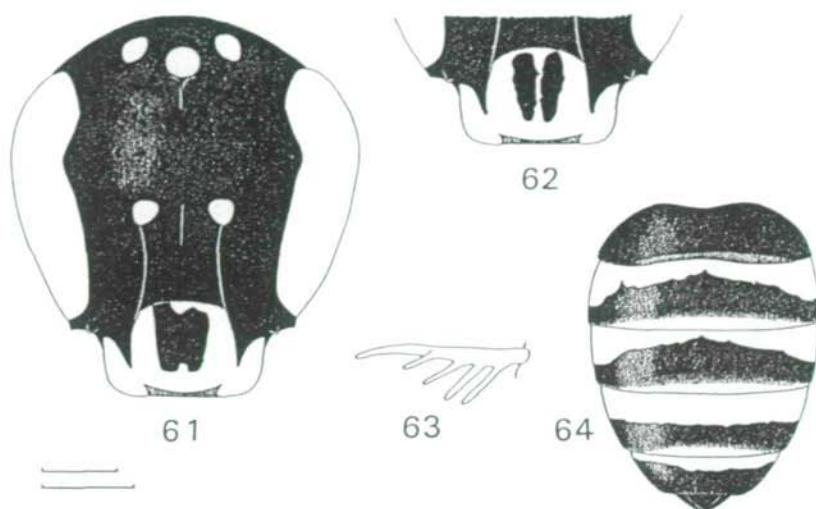
ruguloso-granulate. Genal areas weakly shiny, obscurely sculptured on upper part behind eyes, uniformly densely and finely granulate with weak longitudinal striae near proboscival cavity. Scutum silk-dull on anterior two thirds and moderately shiny on posterior third, obscurely finely granulate (each granula equal to eye facet), with not deep punctures 14-21 separated by 1-3 times of their diameters. Scutellum polished, with distinct punctures 21 separated by 0.5 - 1.5 times of their diameters. Metapostnotum with fine and dense striae fan-shapedly dispersing backwards on its anterior two thirds, finely granulate on its posterior third, polished on its elevated posterior margin. Mes- and metepisterna dull, finely and densely granulate. Posterior vertical surface of propodeum polished, with several obscure pits and rugules. Metasomal terga with obscure granulation similar to scutum; terga 1-3 silk-shiny, succeeding terga becoming shiny. Posterior marginal areas of terga polished.

Coloration. Black without metallic tints. The following parts yellow: labrum; clypeus (except two large longitudinal black spots) (Fig. 52); mandibles (except red apices); band interrupted medially on collar of pronotum, its posterior lobes; spot on anterior part of tegulae; bases of wings; scutellar crests (sometimes partly); median metanotal area; distal end of femora; tibiae (except large brownish black spot on inner surface of middle and hind ones); tarsi; narrow transverse bands on metasomal terga 2-4 or 2-5 broadened laterally backwards to large triangular spots (Fig. 56). Metasomal bands formed by yellow pregradular areas of terga 2-4 or 2-5 visible through brownish translucent posterior marginal areas of preceding terga and by yellow strip on anterior margin of postgradular areas. Scapi and pedicels black; flagella ochre-yellow on lower surface and pale brown to dark brown on upper surface. Wing membranes and tegulae slightly infuscated; veins and stigmatae dark brown.

Vestiture. White, short, not dense, erect, slightly plumose. Paraocular areas below antennal sockets and lower half of frons with white short plumose adpressed hairs.

Female: Structure. Length 5.5 - 5.7 mm. Head flattened, egg-shaped in frontal view; its height / width ratio 1.1 - 1.15 (Fig. 61). Face very slightly impressed on level of antennal sockets. Ocellar elevation distinct. Medial clypeal lobe flattened, as high as broad. Clypeus projecting 0.8 of its height below lower margin of eyes. Supraclypeal area weakly convex, without tubercle before its upper border. Malar space developed, 0.2 - 0.25 of the width of mandibular base. Inner orbits with triangularly rounded notch; its depth about 0.25 of maximal (extrapolated) ocular width in frontal view (Fig. 61, 62); paraocular area in the notch flat. Longitudinal carina between antennal sockets short, not strong, but distinct. Frontal line absent. Scutellum convex. Structure of propodeum and wing venation similar to those of male. Inner metatibial spurs with four teeth (Fig. 63). Metasoma convex, elliptically heart-shaped (Fig. 64); terga flattened, their posterior marginal areas narrowed, not separated from postgradular areas.

Sculpture. Clypeus dull or weakly shiny, shagreened throughout or only on its upper two thirds, with not deep rounded punctures 21-28 separated by 0.3 - 0.8 times of their diameters. Supraclypeal area dull, densely granuloso-shagreened, with several indistinct punctures. Sculpture of frons and vertex similar to that in male. Genal areas with dense and coarse, but indistinct punctation forming oblique rugoses on upper part behind eyes; silk-shiny, densely longitudinally striate near proboscival cavity. Scutum dull, densely and finely granulate (each granula twice smaller than eye facet). Sculpture of scutellum, mes- and metepisterna, metapostnotum, and propodeum similar to those of male, except posterior vertical surface of propodeum, lower part of which is obscurely granulate laterally. Terga 1 and 2 silk-shiny, throughout uniformly finely and



Figs. 61-64. *Ceylalictus (Atronomioides) rostratus*, female (paratypes):
 61 - head (frontal view); 62 - lower part of head of another paratype;
 63 - inner metatibial spur; 64 - metasoma.

densely granulate-shapedly punctate: with punctures about 7 separated by 0.5 times of their diameters. Sculpture of postgradular areas of succeeding terga progressively more obscure, areas becoming shiny, but their posterior marginal areas remaining distinctly granuloso-punctate.

Coloration. Similar to male, except as follows: labrum dark brown; dark spots of clypeus usually conjuncted (Fig. 61); scutellar crests yellow throughout; fore tibiae also with large brownish black spot on their inner surface; hind tarsi brown; pale transverse bands on metasomal terga broader (Fig. 64).

Vestiture. Similar to male, except as follows: short plumose adpressed hairs absent; vertex, scutum, scutellum, and metanotum with admixture of dark hairs.

Holotype: ♂, "Madagascar, Est. [Manahara Province], Soanlerana Ivongo, N. Rantabe, 29.x.1986, L. NILSSON & B. PETTERSSON", IBU.

Paratypes: same data as the holotype, 2 ♂♂, 1 ♀ (IBU), 1 ♂ (ZISP); same locality and collectors, 28.x.1986, 2 ♀♀ (IBU), 1 ♀ (ZISP).

7. *Ceylalictus (Atronomioides) tumidus* PESENKO sp. nov. (Figs. 65-76)

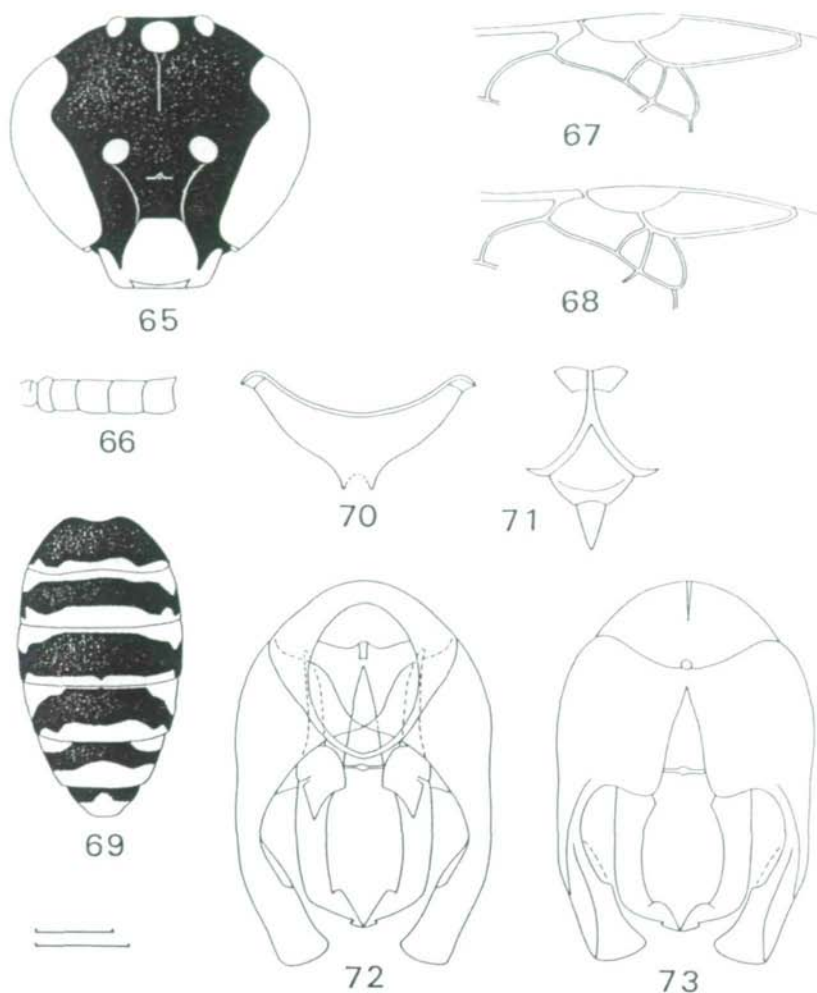
A diagnose is given in the key to the Madagascan species above.

Male: Structure. Length 4.5 mm. Head flattened, but with relatively long vertex, triangularly rounded in frontal view; its height / width ratio 0.95 - 1.0 (Fig. 65). Medial clypeal lobe very weakly convex, almost flat; its height / width ratio 1.1. Clypeus

projecting 0.5 of its height below lower margin of eyes. Supraclypeal area flattened, before its upper border with sharp transverse tubercle. Malar space linear. Inner orbits with relatively deep, triangularly rounded notch; its depth about 0.5 of maximal (extrapolated) ocular width in frontal view (Fig. 65); paraocular area in the notch weakly convex. Longitudinal carina between antennal sockets absent. Frontal line developed only on upper part of frons. Mandibles with subapical dens. Antennae relatively short, reaching the middle of scutellum. First flagomere twice shorter than second one; second flagomere 1.2 - 1.3 times shorter than subsequent ones, its length / diameter ratio 0.75; flagomeres 3-5 as long as their diameters (Fig. 66). Scutellum strongly convex. Metapostnotum bordered laterally and posteriorly by smooth strip, occupying the whole horizontal surface of propodeum laterally, but not reaching its posterior margin, crescent-shaped, with deep transverse impression. Horizontal surface of propodeum 1.2 times shorter than scutellum, forming with posterior vertical surface by a rounded angle of about 135°. Lower half of border between posterior vertical and lateral surfaces of propodeum marked by carina. Marginal cell of forewing relatively narrow, truncated (Fig. 67) or narrowly rounded (Fig. 68) at distal end; second submarginal cell trapezoidal (Fig. 67) or subtriangular (Fig. 68). Hind wings with six distal hamuli on anterior margin. Metasoma convex, elongately elliptical; metasomal tergum 6 enlarged, broadly rounded at posterior end (Fig. 69). Posterior marginal areas of terga flattened, distinctly separated from postgradular areas. Posterior margins of metasomal sterna 4 and 5 straight. Posterior margin of metasomal sternum 7 with two dentes divided by deep rounded notch (Fig. 70). Apical lobe of sternum 8 shaped like triangular star (Fig. 71). Genital foramen longitudinal, elliptical; median gonobasal suture developed partly; posterior margin of gonobase arched on dorsal surface; ventral gonobasal bridge narrowed, situated behind ventral gonocoxal bridge; gonostyli weakly broadened apically, relatively simple, hairless; penis valves relatively narrow, straight, except apical part curved mesally (Figs. 72, 73).

Sculpture. Clypeus weakly shiny, densely punctate. Supraclypeal area shiny, sparsely punctate. Frons dull, densely and finely granulate. Vertex dull, ruguloso-granulate. Genal areas moderately densely punctate on upper part behind eyes, longitudinally rugulose nearly to foramen magnum, shagreened with longitudinal striae on lower part. Scutum shiny, very finely shagreened, with shallow punctures 14-28 separated by 2-5 times of their diameters. Scutellum polished, with punctures 10-21 separated by 0.5 - 2 times of their diameters. Metapostnotum with fine curved striae fan-shapedly dispersing backwards, bordered by polished strip. Mes- and metepisterna weakly shiny, obscurely granulate. Posterior vertical surface of propodeum shiny, with several obscure pits. Horizontal surface of metasomal tergum 1 silk-shiny, with very fine and very dense punctures 5-7 separated by 0.2 - 0.4 times of their diameters; sculpture of postgradular areas of succeeding terga progressively more obscure, areas becoming shiny. Posterior marginal areas of terga polished.

Coloration. Black without metallic tint. The following parts yellow: labrum; clypeus (Fig. 65); mandibles (except red apices); collar and posterior lobes of pronotum; spot on anterior part of tegulae; bases of wings; scutellar crests; median metanotal area; distal end of femora; tibiae; tarsi; transverse bands on all metasomal terga (Fig. 69). Metasomal bands formed by yellow pregradular areas of terga 2-6 visible through translucent posterior marginal areas of preceding terga and by yellow strip on anterior margin of postgradular areas; bands of terga 2-4 broadened laterally backwards to large triangular or rounded spots; bands of terga 5 and 6 broadened medially forward. Scapi and pedicels black; flagella ochre-yellow to ochre-brown on lower surface and brown to black on upper



Figs. 65-73. *Ceylalictus (Atronomioides) tumidus*, male
(65-67 - holotype; 68-73 - paratype): 65 - head (frontal view); 66 - flagomeres 1-5;
67, 68 - part of forewings; 69 - metasoma; 70 - metasomal sternum 7;
71 - metasomal sternum 8; 72, 73 - genitalia (72 - ventral view, 73 - dorsal view).

surface. Wing membranes and tegulae hyaline; veins and stigmatae yellowish brown to brown.

Vestiture. White, short, not dense, erect, slightly plumose; more long and dense between antennal sockets, on scapi, vertex, genal areas, metanotum, and mesepisterna. Face throughout or only its lower half covered with white, very dense plumose adpressed pubescence. Metasomal sterna 6 with several very long hairs on its lateral parts.

Female: Structure. Length 5.8 mm. Head flattened, rounded in frontal view, as high as wide (Fig. 74). Medial clypeal lobe flattened; its height / width ratio 0.75. Clypeus projecting 0.6 of its height below lower margin of eyes. Malar space linear. Inner orbits with relatively not deep, rounded notch; its depth about 0.3 of maximal (extrapolated) ocular width in frontal view (Fig. 74). Longitudinal carina between antennal sockets not strong, but distinct. Frontal line developed only on upper part of frons. Scutellum strongly convex. Propodeum similar to that of male except as follows: metapostnotum not deeply impressed; its lateral and posterior borders indistinct, marked by dull granulate strip. Wing venation of both female paratypes similar to that of holotype and most of male paratypes (Fig. 67). Hind wings with seven distal hamuli on anterior margin. Inner metatibial spurs with three teeth (Fig. 75). Metasoma convex, elongately elliptical (Fig. 76), broader than in male; posterior marginal areas of terga flattened, not separated from postgradular areas medially.

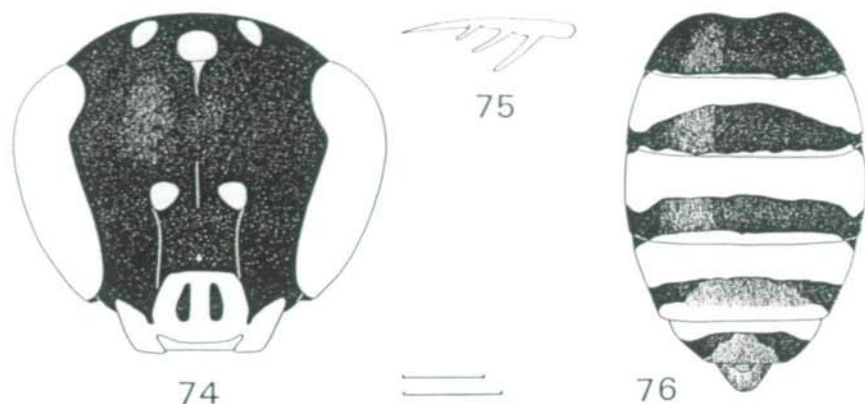
Sculpture. Clypeus shiny, polished, with rounded shallow pits 28-42 separated by 0.2 - 0.5 times of their diameters, except narrow impunctate longitudinal median strip. Supraclypeal area polished on lower half, obscurely punctate and shagreened on upper part and laterally. Frons and vertex dull, ruguloso-granulate. Scutum dull, densely granulate, with sparse deep punctures 14-21 separated by 2-4 times of their diameters. Scutellum polished, with punctures 14-21 separated by 0.5 - 3 times of their diameters; dull, granulate and densely punctate marginally. Metapostnotum with fine curved striae fan-shapedly dispersing backwards on anterior two thirds; silk-dull, obscurely granulate on posterior third; polished in middle of posterior margin. Mes- and metepisterna dull, granulate. Posterior vertical surface of propodeum shiny, punctate. Sculpture of terga similar to those of male except posterior marginal areas of terga, which are finely and weakly granuloso-punctate.

Coloration. Black without metallic tints, except brown tergum 6 and middle part of terga 4 and 5 (Fig. 76). Yellow markings similar to those of male except as follows: labrum yellow or brown; clypeus with two longitudinal brown spots; supraclypeal area with small rounded yellow spot near its lower margin (Fig. 74); fore and middle tibiae with large dark spot on inner surface; hind tibiae brown except yellow proximal fourth; hind tarsi with large dark spot; yellow bands of terga 2-5 broader; tergum 6 without pale band. Coloration of antennae, wing membranes, and tegulae similar to those of male. Veins and stigmatae yellowish brown.

Vestiture. White, short, not dense, erect, slightly plumose; more long and dense on metanotum and mesepisterna. Hairs of vertex and scutum grayish white. Metabasitibial brush goldish pale yellow. Dark-coloured parts of face with sparse white short plumose adpressed hairs.

Holotype: ♂, "Madagascar, Tulear [Toliara] Prov., Toliara (Tulear), 24.xi.1984, on [flowers of] *Parkinsonia aculeata*, Rob[er]t W. BROOKS", UKL.

Paratypes: same data as the holotype, 1 ♂, 1 ♀ (UKL), 1 ♀ (ZISP); same locality, date, and collector, on *Ipomoea pes-caprae*, 6 ♂♂ (UKL), 2 ♂♂ (ZISP); Madagascar, Toliara Province, Ankilibe, 22.iv.1984, R. HENSEN & A. APTROOT, 1 ♂ (RNL).



Figs. 74-76. *Ceylacticus (Atronomioides) tumidus*, female (paratype):
74 - head (frontal view); 75 - inner metatibial spur; 76 - metasoma.

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Literaturbesprechungen

FINKENZELLER, X., GRAU, J. (1996): *Alpenblumen, Steinebachs Naturführer*. - Mosaik Verlag, München, 288 S., 540 Farbfotos, 528 s/w-Zeichnungen.

Am Beginn dieses Buches steht einige Seiten zum Thema "Alpenpflanzen in ihrem Lebensraum". Selten hat der Rezensent eine derart kurze und dennoch umfassende informative Zusammenfassung zur Genese der Alpen zu Gesicht bekommen. Selbst dem blutigsten Laien sind nach dem Studium dieser Zeilen zumindest die wesentlichen Faktoren klar, warum die Alpenflora so existiert, wie wir sie heute kennen.

528 Blumenarten und Zwergsträucher stellen die Autoren in Wort und Bild vor. Die Arten sind im Buch nicht, wie so oft üblich nach Blütenfarben oder Standorten, sondern nach systematischen Gesichtspunkten geordnet. Den ausgezeichneten Farbfotos stehen die kurzen, aber informativen Texte auf einer Doppelseite gegenüber, sodaß die Information zu einer Art sofort verfügbar ist. Die Strichzeichnungen wesentlicher, für die Determinierung notwendiger morphologischer Merkmale erlauben die Bestimmung bis zur Art, ohne Anspruch auf Vollständigkeit erheben zu wollen.

Bedauerlicherweise ließ die Druckqualität des Rezensionsexemplares stellenweise zu wünschen übrig. Manche Farbtafeln erschienen recht flau, manche Textseiten grau statt schwarz. Abgesehen vom drucktechnischen Mangel ist der Inhalt dieses Naturführers dem interessierten Naturbeobachter sehr zu empfehlen.

M. CARL

TRUEB, L.F. (1996): Die chemischen Elemente, ein Streifzug durch das Periodensystem. - S. Hirzel Verlag, Stuttgart. 416 S., 132. Abb., 13 Farbtafeln.

Welcher Autor eines mit Chemie befaßten Handbuches kann schon von sich behaupten, den Leser im Plauderton durch diese sperrige Materie zu führen. Der Autor des vorliegenden Streifzuges durch die Welt der chemischen Elemente kann! Nach einer Begriffsdefinition des "Elements" im Spiegel der Historie sowie einer kurzen Einführung in die geschichtliche Entwicklung des Periodensystems stellt uns der Autor vom ersten Element, dem Wasserstoff bis zum noch nicht benannten Element 112 alle bislang dargestellten Elemente vor. Als Beispiel sei hier das Calcium herausgegriffen, ein Element, das wir täglich zu uns nehmen. Der Abschnitt "Geschichte" widmet sich ausführlich der Entdeckung durch den Menschen und einigen anekdotischen Besonderheiten zur Verwendung. So wird angemerkt, daß "die großen Feldsteine, mit denen sich die Helden von Homers Ilias vor Troja in kriegerischer Absicht bewarfen, sehr wahrscheinlich aus Calciumcarbonat bestanden". "Vorkommen und Gewinnung" z.B. in Form von Kalkpanzern mariner Flagellaten, "physikalische und chemische Eigenschaften" sowie physiologische Besonderheiten im Stoffwechsel der Lebewesen bringen dem Leser sämtliche Aspekte der Calciumchemie der belebten und unbelebten Natur anschaulich nahe. Der Laie wundert sich im Abschnitt "Verbindungen, Verwendungen und Technologien" regelmäßig, für welche menschlichen Aktivitäten die jeweiligen Elemente eingesetzt werden. Ohne belehrend zu wirken ist dem Autor mit dem vorliegenden Handbuch ein lehrreicher Streifzug durch die Welt der chemischen Elemente gelungen.

M. CARL

BAYERISCHE LANDESANSTALT F. WASSERFORSCHUNG (Hrsg.) (1995): Entwicklung von Zielvorstellungen des Gewässerschutzes aus der Sicht der aquatischen Ökologie. - Oldenbourg Verlag, München, 615 S., zahlr. s/w-Abb.

Die Fließ- und Stehgewässer der Erde beherbergen eine unglaublich große Zahl an Tieren und Pflanzen, die sich hochspezialisiert an das Leben im aquatischen Milieu angepaßt haben. Da die Gewässer und ihre Bewohner keinesfalls isoliert betrachtet werden können, sondern schon aufgrund der Autökologie vieler Arten vielmehr in enger Verzahnung mit dem sie umgebenden Land zu sehen sind, streben einige Autoren der 27 Einzelbeiträge in diesem Band eine ganzheitliche Betrachtungsweise an. Im Vordergrund steht jedoch stets folgende Frage: Was sollen und können wir wollen, wenn wir die Gewässer unserer Landschaft vor negativen anthropogenen Einflüssen schützen? Erst wenn die gesellschaftlichen und politischen Voraussetzungen für den Gewässerschutz gegeben sind, können Grundlagenerhebungen, ökologische Bewertung und die Entwicklung von Leitbildern sinnvoll sinnvoll aufeinander aufbauen.

Folgende fünf Themenblöcke fassen die jeweiligen Artikel zusammen: Grundlagenerhebungen für die Entwicklung von Zielvorstellungen am Beispiel fließender Gewässer, Grundlagenerhebungen für die Entwicklung von Zielvorstellungen am Beispiel stehender Gewässer, Fischereibiologie, ökologische Bewertung aus stofflicher Sicht, ökologische Bewertung aus biozönotischer Sicht.

Das weite thematische Spektrum dieses Übersichtsbandes zum Gewässerschutz aus dem Blickwinkel der aquatischen Ökologie macht ihn zu einem Gewinn für jeden, der sich mit dem Thema beschäftigt.

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