

## Imagines and larvae of the new species of the genus *Nitops* Murray, 1864 (Coleoptera: Nitidulidae: Carpophilinae) from Brazil and notes on their bionomy

### Имаго и личинки новых видов рода *Nitops* Муррай, 1864 (Coleoptera: Nitidulidae: Carpophilinae) из Бразилии и замечания по их биологии

Kirejtshuk A.G.<sup>1</sup>, Kurochkin A.S.<sup>2</sup> & Monteiro R.F.<sup>3</sup>  
Кирейчук А.Г.<sup>1</sup>, Курочкин А.С.<sup>2</sup> & Монтейро Р.Ф.<sup>3</sup>

<sup>1</sup> Zoological Institute of the Russian Academy of Sciences, Universitetskaya emb. 1, Saint Petersburg, 199034, Russia. E-mail: AK3929@AK3929.spb.edu

<sup>2</sup> Samara State University, Akademika Pavlova str. 1, Samara 443011, Russia. E-mail: nitidula@mail.ru

<sup>3</sup> Federal University of Rio de Janeiro, Department of Ecology – IB/CP 68020, CEP 21941-590, Rio de Janeiro, Brazil. E-mail: monteiro@biologia.ufrj.br

<sup>1</sup> Зоологический институт Российской Академии Наук, Университетская наб., д. 1, Санкт-Петербург 199034, Россия.

<sup>2</sup> Самарский государственный университет, ул. Академика Павлова, д. 1, Самара 443011, Россия.

<sup>3</sup> Федеральный университет Рио-де-Жанейро, Отдел экологии, IB/CP 68020, CEP 21941-590, Рио-де-Жанейро, Бразилия.

KEY WORDS: Coleoptera, Nitidulidae, Carpophilinae, *Nitops*, new species, new combination, composition, position, larvae, bionomy.

КЛЮЧЕВЫЕ СЛОВА: Coleoptera, Nitidulidae, Carpophilinae, *Nitops*, новые виды, новые комбинации, состав, положение, личинки, биология.

ABSTRACT. Three new sap beetles species from Brazil from the subfamily Carpophilinae: *Nitops* (*Nitops*) *cerei* sp.n., *N.* (s.str.) *modicus* sp.n. and *N.* (s.str.) *pilosocerei* sp.n. are described and the mature larvae of two of them are also described in the paper. Notes on the composition of the subgenus *Nitops* Murray, 1864 sensu stricto and bionomy of the considered group are given. Eight species: *Carpophilus craigheadi* Dobson, 1972, *C. curtipes* Sharp, 1899, *C. distinctus* Reitter, 1873, *C. megalopus* Dobson, 1972, *C. languidus* Erichson, 1843, *C. ochraceus* Erichson, 1843, *C. sordidus* Erichson, 1847 and *C. vitraci* Grouvelle, 1902 are transferred to genus *Nitops*. *Carpophilus weyersi* Grouvelle, 1900 is transferred to genus *Taeniolinus* Kirejtshuk, 1998.

РЕЗЮМЕ. Описаны 3 новых вида жуков-блестянок из Бразилии из подсемейства Сагrophилинае: *Nitops* (*Nitops*) *cerei* sp.n., *N.* (s.str.) *modicus* sp.n. и *N.* (s.str.) *pilosocerei* sp.n., а также личинки старших возрастов для двух из этих новых видов. Даны замечания по составу подрода *Nitops* Муррай, 1864 sensu stricto и биологии рассмотренной группы. Восемь видов: *Carpophilus craigheadi* Dobson, 1972, *C. curtipes* Sharp, 1899, *C. distinctus* Reitter, 1873, *C. megalopus* Dobson, 1972, *C. languidus* Erichson, 1843, *C. ochraceus* Erichson, 1843, *C. sordidus* Erichson, 1847 и *C. vitraci* Grouvelle, 1902 перенесены в род *Nitops*. *Carpophilus weyersi* Grouvelle, 1900 перенесён в род *Taeniolinus* Kirejtshuk, 1998.

### Introduction

The subfamily Carpophilinae as defined by A.G. Kirejtshuk [1986a, 1986b] is not strongly differentiated and consists of few monomorphous groups, which sometimes are difficult for discrimination, and females of them could be mixed with groups of subfamily Epuraeinae. Nevertheless some division could be recognized due to some more or less stable characters mostly in the male abdominal apex, particularly in pregenital and genital sclerites. The basic division of this subfamily was made by A. Murray [1864], who regarded this subfamily as genus *Carpophilus* Stephens, 1830 and proposed for it 10 subgeneric groups, including 8 ones were newly named.

Subgenus *Nitops* was proposed by A. Murray [1864] for 3 species *Carpophilus ophtalmicus* Murray, 1864, *C. sordidus* (Erichson, 1847) and *C. pubescens* Murray, 1864. Another subgenus *Endomerus* was defined as uniting other 3 species *C. piger* Murray, 1864, *C. senex* Murray, 1864 and *C. languidus* Erichson, 1843. He characterized species of the first subgenus as with "... broad head and coarsely granulated eyes. The exposed dorsal part of the abdomen is short, making the elytra look long.", while species of the second have 3 exposed segments of abdomen, "enclosed like the joints of the telescope within the preceding segment". E. Reitter in 1873 described two new species in the subgenus *Nitops* [*C. (Nitops) crassicollis* and *C. (s.str.) distinctus*]

and later one more species [*C. (s.str.) dohrni* Reitter, 1876]. D. Sharp (1899) ignored the Murrays' division of the genus, because it as "Murray divided the genus into several subgenera, but the majority of his divisions are quite useless, if not worse, for the purposes of arrangement and determination...". Nevertheless, A. Grouvelle accepted the Murrays' subgeneric division and described *C. (s.str.) weyersi* Grouvelle, 1900 and in the Junk's catalogue [Grouvelle, 1913] he synonymized the mentioned subgeneric names and added to this group also some species described by D. Sharp [1899], namely: *C. (Nitops) concolor*, *C. (N.) crassus*, *C. (N.) curvipes*, *C. (N.) palmatus*, and *C. (N.) ventralis*. All the listed species originated from Central and South America, except for *C. pubescens* from Sri Lanka and *C. weyersi* from Sumatra. After the latter publication nobody used this taxon. A.G. Kirejtshuk [1997] restored it and elevated it to the generic level with two subgenera *Nitops* sensu stricto and *Urocarpolus* Kirejtshuk, 1997. The genus in general can be separated from all other groups of the Carpophilinae due to the characteristic unexcised hypopygidial and abruptly transverse pygidial apices in males, which forming together a round foramen for the apically projecting anal sclerite. Species of the genus have a quite characteristic structure of the female pygidium. Among other distinctions, it is important to mention their eyes consisting of rather large facets, pronotum gently sloping at sides and widely rounding at all angles and antennal grooves distinctly outlined at their ends.

Mature larvae of the subfamily Carpophilinae were characterized by many authors. Most detailed and comprehensive studies on larvae are those by N. Hayashi [1978] comprising descriptions of 10 carpophilin species from Japan and by W.A. Connell [1957] who described larvae of 11 North American carpophilin species, including larva of *Nitops (Urocarpolus) floralis* (Erichson, 1843).

The specimens of this group are comparatively rare in collections and, therefore, most species of it are still waiting for further description. Recently some adults were collected in Brazil together with larvae on flowers of cacti. All of them belong to three new species. The description of these adults and larvae was a goal of this publication. However, this goal could not be reached without a preliminary revision of the subgenus *Nitops* sensu stricto. The authors were lucky in possibility to check most type series of species of this subgenus and elaborate a comprehensive diagnoses for the species here described.

The terms for larval structures in the below descriptions correspond with their interpretation in the publications by N. Hayashi [1978] and J.F. Lawrence [1991].

**TECHNIQUE.** All studied larvae are kept in 70% alcohol. It should be noted that drawings of the whole larvae may often not match exactly the alive specimens in shape and proportions due to they were kept in alcohol or in some other preservation solutions that mostly affect negatively the larvae. Moreover, such phenomenon becomes more expressed at larvae after

their treatment with KOH solution. Besides, descriptions of 2 mature larvae given below mostly coincide with each another because many structures bear no specific differences or demonstrate some degree of similarity. Due to this peculiarity the drawings of the larvae structures were carried out only for a single species in case of their similarities at both species, and have been referred to each of 2 species when the particular structures were somewhat different. Additionally, some setae could remain unrecognized due to their small size and pale coloration.

**DEPOSITORIES:** BMNH—Natural History Museum in London, formerly British Museum of Natural History; DEIM — Deutsches Entomologisches Institute, Münchenberg, before Eberswalde – Finow; MNHN — Muséum National d'Histoire Naturelle in Paris; MNRJ — Museu Nacional do Rio de Janeiro; NMW — Naturhistorisches Museum in Wien, Vienna; ZIN — Zoological Institute of Russian Academy of Sciences, St.-Petersburg; ZMB — Zoologisches Museum in Berlin.

***Nitops (Nitops) cerei* Kirejtshuk et Kurochkin sp.n.**

Figs 1–23.

**MATERIAL.** Imagines: holotype, male (MNRJ) and 17 paratypes (MNRJ and ZIN) – "Parque Nacional da Restinga de Jurubatiba, Macae, Rio de Janeiro State, 24.01.2002", "on flowers of *Cereus fernambucensis* Lem."; 19 paratypes (BMNH, MNRJ, ZIN and ZMB) — ibid., "15.03.1999", on flowers of the same species; larvae: 10 spec. (MNRJ and ZIN) with the same labels.

**ADULTS:** Figs 1–12.

**Male (holotype).** Length 3.1, breadth 1.4, height 0.7 mm. Rather convex dorsally and ventrally; unicolourous light brownish to reddish with lighter eyes; with slight fat shine; dorsum with moderately conspicuous yellowish subrecumbent hairs, about twice as long as distance between their insertions.

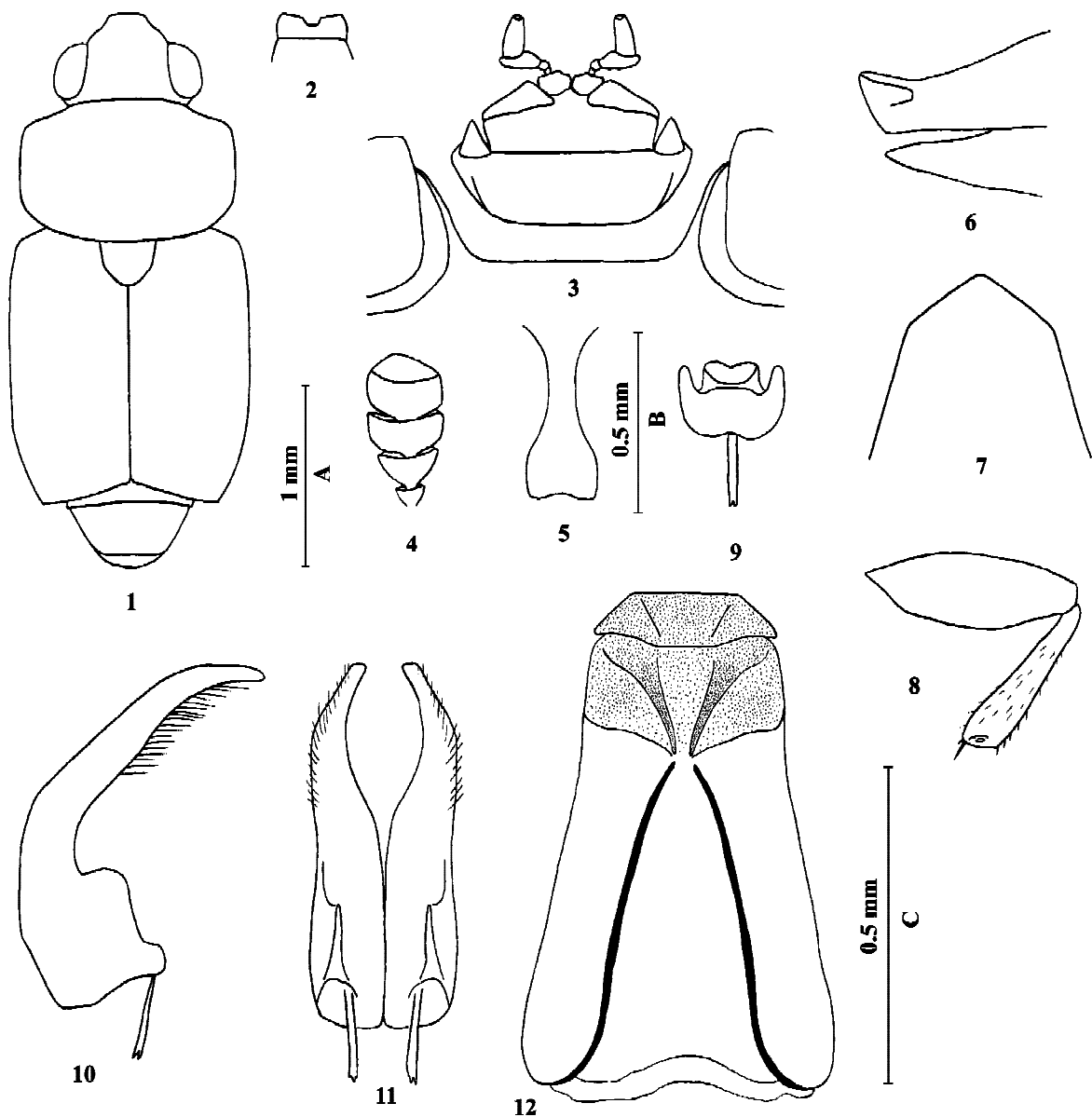
Head and pronotum with regular and not quite distinct punctures, about 1/2 as large as eye facets in diameter, interspaces between punctures somewhat greater than puncture diameter, very densely, smoothly and very finely cellularly microreticulated. Elytra with punctures very shallow and much smaller than on head and pronotum, and interspaces between them much broader. Uncovered tergites with very small punctures, but interspaces between punctures yet broader and reliefly microreticulated. Surface of prosternum with obsolete puncturation and rather smooth cellular microreticulation. Surface of metasternum, prosternal process and ventrites somewhat similar to that on head and pronotum, but punctures smaller, shallower and more sparse, interspaces between them as sculptured as surface of prosternum.

Head about as long as distance between eyes (composed of rather large facets), very slightly convex (distance between eyes nearly as broad as combined width of eyes). Labrum with subtruncate apices of lobes, moderately exposed forwards (about 1/3 as long as their combined width), median excision rather shallow and broad. Mandibles slightly exposed. Antennae markedly shorter than head breadth, their club compact, comprising about 1/3 of total antennal length, somewhat more than 1 and 1/2 as long as wide, scape nearly 1/2 as long as club, antennomere 2 somewhat shorter than antennomere 3 and twice longer antennomere 4. Pronotum subquadrate, moderately vaulted at disk and steeply sloped at unexplanate sides, with slightly convex anterior and posterior edges, base very narrowly bordered, anterior

and posterior angles widely rounded. Scutellum subpentagonal and rounded at apex. Elytra about as long as their combined width, steeply sloped at extremely narrowly explanate sides. Pygidium with moderately extended and subtruncate apex.

Mentum about twice as wide as long. Last labial palpomere about twice as long as wide. Antennal grooves deeply and almost rectilinearly convergent behind mentum and clearly joining, with sharply raised inner and outer edges, outer edge divided into a continuation of antennal groove and

a parocular groove. Distance between procoxae about  $\frac{2}{3}$  times as great as that between metacoxae and nearly subequal to that between mesocoxae. Prosternum with a distinct groove along anterior edge and with process rather curved along coxae, slightly widened before emarginate apex, which  $\frac{3}{5}$  as wide as antennal club. Mesosternum deeply excavate and simple. Metasternum flattened with distinct median suture, its posterior edge between coxae deeply and nearly arcuately excised. Submesocoxal lines follow closely hind edge of cavities and strongly deviated at anterior corners of metastern-



Figs 1-12. *Nitops* (s.str.) *cerei* sp.n.: 1 — male body; 2 — fore part of head with labrum; 3 — surface of head with a contour of antennal grooves, maxillar and labial palpi; 4 — antennal club; 5 — prosternal intercoxal process; 6 — apex of female abdomen; 7 — female pygidium; 8 — male metafemur and tibia; 9 — ventral plate and *spiculum gastrale* of male; 10-11 — tegmen; 12 — ovipositor; 1-2, 7-8 — dorsal; 3, 5, 11-12 — ventral; 6, 10 — lateral. Scales: A to Fig. 1; B to Figs 2, 9; C to Figs 3-8, 10-12.

Рис. 1-12. *Nitops* (s.str.) *cerei* sp.n.: 1 — самец, контур тела; 2 — передняя часть головы с верхней губой; 3 — поверхность головы с контурами усиковой ямки, челюстных и губных щупиков; 4 — булава усика; 5 — межтазиковый отросток переднегруди; 6 — верхина брюшка самки; 7 — пигидий самки; 8 — задние бедро голень самца; 9 — вентральная пластинка и *spiculum gastrale* самца; 10-11 — термен; 12 — яйцеклад; 1-2, 7-8 — сверху; 3, 5, 11-12 — снизу; 6, 10 — сбоку. Масштаб: А для Рис. 1; В для Рис. 2, 9; С для Рис. 3-8, 10-12.

num. Ventricle 1 somewhat longer than hypopygidium as well as than ventrites 2–4 combined. Hypopygidium with moderately excised apex and without trace of depression before the middle of excision.

Tibiae simple and subtriangular, slightly narrower than antennal club, their inner edge almost straight, outer edge of meso- and metatibiae with moderate setae. Femora of usual configuration, pro- and mesotibiae almost 2.5 times, but metafemur almost 3.0 times as wide as corresponding tibiae, metafemur with moderately convex posterior edge. Tarsi about 2/3 as long as protibia, protarsi 3/5 as wide as protibiae, meso- and metatarsi narrower, claws simple.

Aedeagus moderately sclerotized. Ventral plate with distinct lateral lobes.

**Female.** Pygidium angular and somewhat elevated at apex and bearing a pore at each side of apex, hypopygidium widely rounded at apex. Protarsus 1/3 as wide as protibiae. Ovipositor moderately sclerotized.

**Variations.** Length 2.5–3.3, breadth 1.3–1.7, height 0.7 mm. Many paratypes are more or less darker than the holotype. A small variability is observed in puncturation and sculpture of integument. The female pygidium shows some variability of shape of its apex.

**DIAGNOSIS.** This new species belongs to the group of related species, which, in contrast to the other consubgenera, are characterized by the more or less subparallel-sided and more slender body with larger eyes (see below on composition of the subgenus). It is most similar to *Nitops* (s.str.) *concolor* (Sharp, 1889), but differs from it in the darker and more robust body with parallel-sided pronotum and somewhat shorter abdomen, markedly larger eyes, shorter elytra, longer antennal club, somewhat wider protarsus, elevated pygidial apex in female, shape of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor.

Besides, this new species differs from:

— *Nitops* (s.str.) *craigheadi* (Dobson, 1972) (according to the paratypes in BMNH) and *Nitops* (s.str.) *megalops* (Dobson, 1972) (according to the holotype in BMNH) in the much darker, much wider and more robust body, somewhat smaller eyes consisting of smaller facets (distance between eyes about as great as combined width of eyes), finer, shallower and denser dorsal puncturation, much relief sculpture on interspaces between punctures on dorsum, different outline of labral lobes (not subtruncate), somewhat denser, longer and much more conspicuous dorsal pubescence, somewhat widened apex of prosternal process, subacute and somewhat explanate apex of female pygidium (not subtruncate). *N. craigheadi* and *N. megalops* very similar in most characters, although the first has the body much more slender, somewhat smaller, lighter, deeply and coarsely punctured with smoothed interspaces between punctures;

— *Nitops* (s.str.) *distinctus* (Reitter, 1873), **comb.n.** only in the darker body, longer hairs on dorsum, somewhat smaller eyes (distance between eyes in *N. distinctus* as great as combined width of eyes), shape of the male ventral plate and male genitalia (although ovipositors of both species are rather similar and with widely truncate apices);

— *Nitops* (s.str.) *ochraceus* (Erichson, 1843), **comb.n.** in the darker and more robust body, shorter dorsal pubescence, longer elytra, shorter portion of exposed abdomen, somewhat smaller eyes (distance between eyes in *N. ochraceus* as great as combined width of eyes), shorter last abdominal segment, somewhat wider protarsus, elevated pygidial apex in female, shape of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor.

#### MATURE LARVA: Figs 13–23.

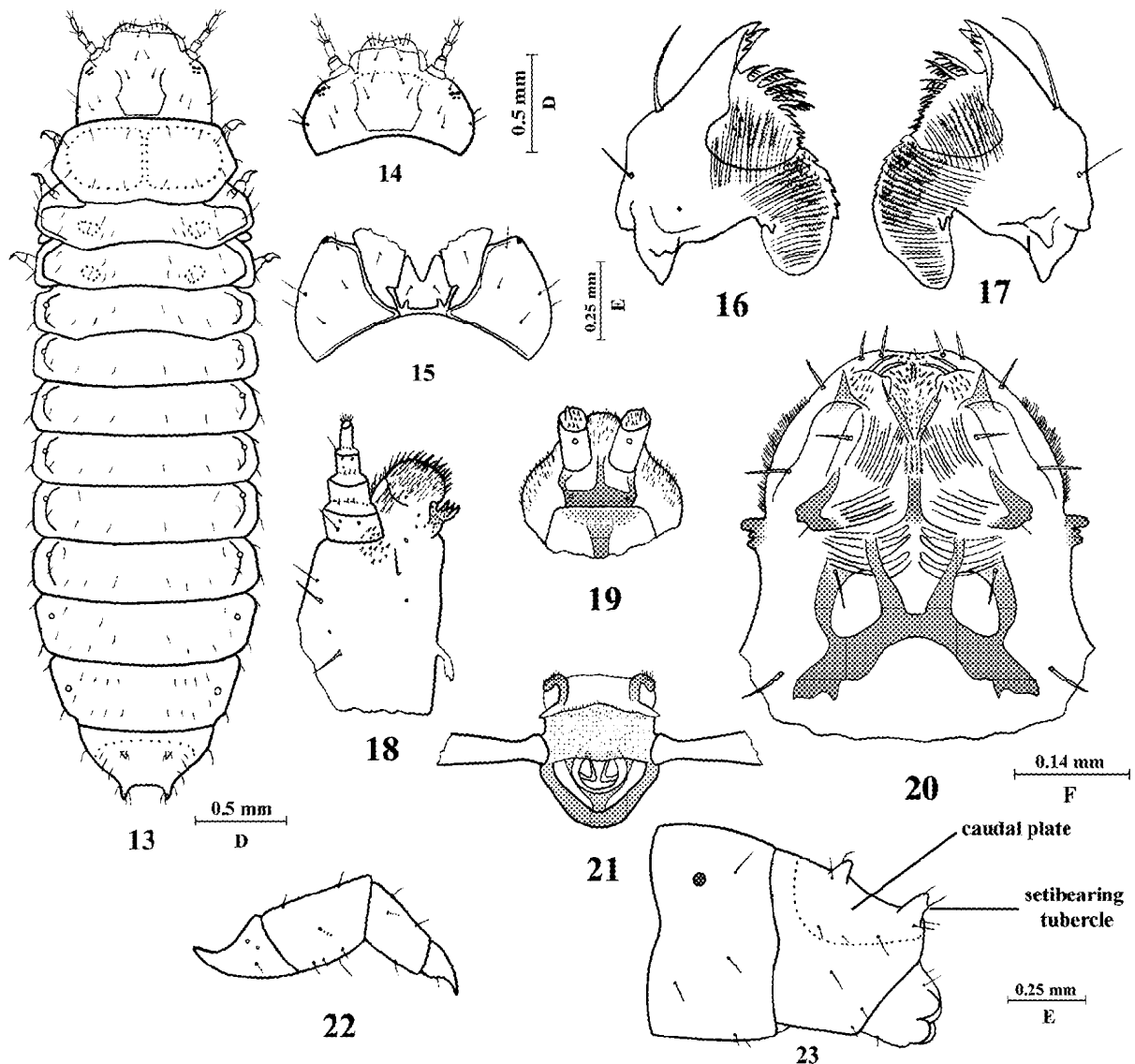
**Description.** Body length 5.00–6.10 mm (with urogomphi), breadth 1.35–1.40 mm. Head capsule length 0.65–0.70 mm, breadth 0.77–0.80 mm. Body rather strongly elongate, widened medially, subdepressed dorsally and ventrally, slightly shining dorsally, with thoracic and abdominal terga to abdominal tergum VIII without tubercles, creamy-white, except head capsule, spiracles, legs, pregomphi and urogomphi, all brown to light brown. Anterior pair of ocelli black and posterior ones brownish. Head capsule, legs, urogomphi and pregomphi shining. Cervical region membranous (becoming visible after a processing in the KOH solution). All setae very pale, comparatively short and poorly distinguishable.

Head capsule with labrum fused with frons, somewhat protracted into prothorax (characteristic of alive specimens); frontal sutures finely impressed and curved forming distinct angles inwards anteriorly; vertex with elongate, subparamedian, longitudinal and rather shallow impressions. Head capsule gently widened near its base (characteristic of alive specimens) or moderately widened submedially (after processing in KOH solution), posterior edge of head capsule moderately emarginate, with 2 pairs of larger anterior ocelli and with 2 pairs of posterior ocelli reduced into small spots. Vertex with 2 larger and 2 smaller median setae, a seta behind the base of each antenna, a pair of large setae externally frontal sutures and a small seta near each of them, and 2 large posterolateral setae. Frons with 2 small median setae. Labrum with moderately excised anterior edge, 4 small median setae along edge, 2 large submedian and 2 large sublateral setae. External edge of mandibles visible from above. Ventral surface of head capsule with 2 posterosublateral setae, 2 large sublateral setae, a large seta near each groups of ocelli and 2 submedian setae. Maxillary articulating area with a pair of large median setae; each stipes with a large seta. Antennal scape about as long as wide, pedicel about 1.15 times as long as scape and flagellum about half as long as scape and with 4 short setae apically; sensorium very small, subconical and with a pair of basal setae. Mandible with a sharply-pointed bidentate apex; ventral cutting edge of each left and right mandible with 3 teeth; dorsal cutting edge without teeth; external surface rather moderately produced; bearing a very long external seta and a shorter subexternal seta, with well developed and rather moderately narrow ventral condyle, and weakly developed accessory ventral process; prostheca with a broad base and strongly coarsely fringed and with fine oblique ridges and microasperities, but with scarce and distinct ventral asperities; mola well developed, with 5 teeth at its outer edge for left mandible and with microerrated outer edge for right mandible, and both have fine transverse ridges and microasperities. Maxilla with palpiger distinctly articulated with stipes; with 2<sup>nd</sup> joint about 1.2 times as long as 1<sup>st</sup>, and 3<sup>rd</sup> joint a bit longer than 2<sup>nd</sup>. Palpiger with a large seta and with scarce asperities at very base. Mala well developed, moderately sclerotized, subtruncate at apex covered with dense microtrichia, its outer lateral part with smaller microtrichia and asperities. Uncus heavily sclerotized, coarsely notched and consisting of 2 sharply-pointed teeth (one of which bifurcate). Proxistipes with scarce distinct median asperities and a seta at them and with a pair large sublateral setae. Dististipes with a large seta. Labium with palpi narrowly separated from each other, about twice as long as wide, each palpus with a truncate apex with microasperities, and with a small conical sensorium; ligula rather conspicuously produced and almost reaching apices of palpi, bearing dense and distinct microtrichia. Suture between mentum and submentum absent. Labroclypeal epipharynx and hypopharyngeal sclerome as illustrated.

Protergum with a quite peculiar posterior edge (see Fig. 13). Prothorax with well expressed lateral angles, posterior

margin of prothorax slightly convex and very slightly emarginate medially. Protergum with 2 antero- and 2 posterolateral setae, and consisting of two moderately sclerotized, large and shining transverse plates, each of which bears 2 anterior, 2 posterior and 2 lateral setae. Mesotergum with 2 moderately sclerotized and shining plates of irregular shape, each with a seta; tergum with 2 subanteromedial, 2 posteromedial, 2 posterosubmedial, 4 sublateral and 2 almost lateral setae. Mesothoracic spiracular sclerites well developed and conspicuously protruding and each has a small seta, each with rather strongly developed spiracular tube. Metatergum with 2 moderately sclerotized and shining elongate plates somewhat smaller than at mesotergum, and each with a seta;

tergum with the same setae as in thoracic segment, but instead of 2 almost lateral setae with 2 posterolateral setae. Metathoracic spiracular sclerites less strongly developed than mesothoracic ones. Abdomen consisting of 9 segments subequal in size. Tergum of each segment 1–8 with 2 anterolateral, 2 posterolateral, 2 median setae, and a seta distant behind from each spiracle. Tergum of segment 1 bears 4 posterior setae. Tergum of each of segments 2–5 with 2 posterior setae. Tergum of each of segments 5–8 with a seta located somewhat medially from each spiracle. Tergum of each of segments 6–8 with 4 posterior setae, tergum of segment 7 additionally with 2 anteroparamedian setae, and tergum of segment 8 with 4 anterosubmedian setae. Tergum of segment



Figs 13–23. *Nitops* (s.str.) *cerei* sp.n.: 13 — mature larva; 14–15 — head (after KOH treatment); 16 — mandible, left; 17 — idem, right; 18 — maxilla, right; 19 — labium, anterior parts; 20 — labroclypeal epipharynx; 21 — hypopharynx; 22 — metathoracic leg; 23 — apex of abdomen; 13–14, 16, 21 — dorsal; 15, 17–20 — ventral; 22 — posterior; 23 — lateral. Scales: D to Figs 13–14; E to Figs 15, 23; F to Figs 16–22.

Рис. 13–23. *Nitops* (s.str.) *cerei* sp.n.: 13 — взрослая личинка; 14–15 — голова (после очистки KOH); 16 — левая мандибула; 17 — правая мандибула; 18 — правая максилла; 19 — передняя часть нижней губы; 20 — эпифаринкс; 21 — гипофаринкс; 22 — задняя нога; 23 — вершина брюшка; 13–14, 16, 21 — сверху; 15, 17–20 — снизу; 22 — сзади; 23 — сбоку. Масштаб: D для Рис. 13–14; E для Рис. 15, 23; F для Рис. 16–22.

9 with 2 large lateral setae, with moderately sclerotized, rather large and shining caudal plate bearing 4 small sublateral and 2 large sublateral setae. Segment 9 with well developed, rather short, moderately separated and almost sharply-pointed urogomphi, with apices slightly bound upwards, each of which bears an apical seta on its dorsal surface, a seta at base, and a median seta being on small and distinct setibearing tubercle on its ventral surface, surface between urogomphi almost flat; with small, paired, rather moderately separated pregomphi and somewhat bound upwards, with rounded apices, each of them with a large basal and a smaller subapical seta. 10<sup>th</sup> abdominal segment moderately developed and not visible dorsally. Spiracles present on mesothoracic spiracular sclerites and anterolaterally on segments 1–8. Spiracles of normal size, moderately sclerotized, annular-biforous and oval, slightly projecting above the body surface.

Legs moderate in length and subequal, trochanter with a seta; femur about 1.4 times as long as tibia and has at least 7 setae; tibia about 1.5 times as long as wide and with at least 4 setae; tarsungulus about half as long as tibia, moderately widened at base, with moderately curved and sharp tip and a small ventral seta.

NOTE. The larvae collected with many adults of *N. (N.) cerei* sp.n. are regarded here as conspecific with these adults, however, another series of adults from *Cereus* examined includes comparable proportions of 2 new species [*N. (N.) cerei* sp.n. and *N. (N.) modicus* sp.n.]. Nevertheless, the larvae described are preliminarily considered as occurring together with adults of *N. (N.) cerei* sp.n.]

DIAGNOSIS. The mature larva of *N. (s.str.) ?cerei* sp.n. is most similar to the mature larva of *N. (s.str.) pilosocerei* sp.n., and to one more known to us described third-instar larva of the subgenus *Urocarpolus* of the genus *Nitops* — *N. (U.) floralis*, but is distinguished from the first by the peculiar outline of posterior edge of prothorax, by meso- and metathoraces with paired sclerotized plates, each of sclerotized plates of prothorax with 2 anterior, 2 posterior and 2 lateral setae, and peculiar chaetotaxy on dorsal surface of the head, presence of setibearing tubercle on each urogomphus; from the second species in the peculiar outline of the posterior edge of prothorax, each of sclerotized plates of prothorax with only 2 anterior, 2 posterior and 2 lateral setae, and vertex with a pair of larger externally frontal sutures setae and a smaller seta near each of them, presence of a setibearing tubercle on each urogomphus. The mature larva of *N. (s.str.) pilosocerei* sp.n. is also very similar to the mature larva of *N. (s.str.) ?cerei* sp.n. and to third-instar larva of *N. (U.) floralis*, but differing from both in the characters given in the key below. The third-instar larva of *N. (U.) floralis* also very resemble the mature larvae of two other species, and can be diagnosed due to the characters proposed in the key below as well.

ETYMOLOGY: The Latin name of this new species is derived from the generic name of cactus *Cereus*, in flowers of which both active instars occur.

***Nitops (Nitops) modicus* Kirejtshuk et Kurochkin sp.n.**  
Figs 24–37.

MATERIAL: holotype (ZMB), male and 6 paratypes (ZMB and ZIN) — “Brazil, S.Paulo, Ubatuba, 15.XII.93, M. Vega S.G.” (named by O. Marek); 1 paratype (MNRJ) — “Parque Nacional da Restinga de Jurubatiba, Macae, Rio de Janeiro State, 15.03.1991”, “on flowers of *Cereus fernambucensis* Lem.”; 15 paratypes (BMNH, MNRJ, ZIN and ZMB) — *ibid.*, “24.01.2002”, on flowers of the same species.

**Male (holotype).** Length 3.2, breadth 1.5, height 0.9 mm. Rather convex dorsally and ventrally; unicolourous light

brownish to reddish with lighter eyes, underside brown; with slight fat shine; dorsum with moderately conspicuous yellowish subrecumbent hairs, about twice as long as distance between their insertions.

Head with regular and not quite distinct punctures, somewhat smaller than eye facets in diameter, interspaces between punctures somewhat greater than puncture diameter, very densely, smoothly and very finely cellularly microreticulated. Pronotum and elytra with punctures shallower and somewhat smaller than those on head, interspaces between them much broader (at elytral apex they about twice as large as puncture diameter) and with rather relief and fine cellular microreticulation. Uncovered tergites with punctures similar to those on elytral apices, but somewhat larger and interspaces between them yet broader and relief microreticulated. Surface of prosternum with fine and sparse puncturation, and also with somewhat smooth cellular microreticulation. Surface of metasternum, prosternal process and ventrites somewhat similar to that on pronotum and elytra, but punctures on prosternal process and metasternum more distinct and more sparse, interspaces between them as sculptured as surface of head to that of prosternum.

Head much shorter than distance between eyes (composed of moderately large facets), very slightly convex (distance between eyes nearly 2.5 times as broad as combined width of eyes). Labrum with subsemicircular to subtruncate apices of lobes, moderately exposed forwards (about 1/3 as long as their combined width), median excision moderately shallow and broad. Mandibles well exposed. Antennae markedly shorter than head breadth, their club compact, comprising about 2/7 of total antennal length, somewhat more than 1 and 1/2 as long as wide; scape more than 1/2 as long as club, antennomere 2 much shorter than antennomere 3 and twice longer antennomere 4. Pronotum subquadrate, moderately vaulted at disk and steeply sloped at unexplanate sides, with slightly convex anterior and posterior edges (and with a shallow emargination at anterior edge), base very narrowly bordered, anterior and posterior angles widely rounded. Scutellum comparatively long and widely rounded at apex. Elytra slightly shorter than their combined width, steeply sloped at extremely narrowly explanate sides. Pygidium with moderately extended and widely rounded to subtruncate apex.

Mentum about twice as wide as long. Last labial palpomere about 3 times as long as wide. Antennal grooves deeply and almost rectilinearly convergent behind mentum and clearly joining, with sharply raised inner and outer edges, outer edge divided into a continuation of antennal groove and a parocular groove. Distance between procoxae about 2/3 times as great as that between metacoxae and nearly subequal to that between mesocoxae. Prosternum with a distinct groove along anterior edge and with process rather curved along coxae, slightly widened before truncate apex, which 3/5 as wide as antennal club. Mesosternum deeply excavate and simple. Metasternum flattened with distinct median suture, its posterior edge between coxae deeply and nearly angularly excised. Submesocoxal lines follow closely hind edge of cavities and strongly deviated at anterior corners of metasternum. Ventrite 1 almost twice as long as hypopygidium and almost as long as ventrites 2–4 combined. Hypopygidium with shallowly apex and without trace of depression before the middle of excision.

Tibiae simple and subtriangular, meso- and metatibiae slightly narrower than antennal club, their inner edge curved (particularly in metatibia), but protibia distinctly wider than antennal club, its inner edge almost straight, outer edge of meso- and metatibiae with moderate setae. Pro- and mesofemora of usual configuration, profemur about 1 and 1/3 and mesofemur about

1.5 times as wide as corresponding tibiae; but metafemur rather curved, about more than 1.5 times as wide as corresponding tibia, with emarginate posterior edge. Tarsi about 3/4 as long as protibia, protarsi nearly 1/2 as wide as protibiae, meso- and metatarsi narrower, claws simple.

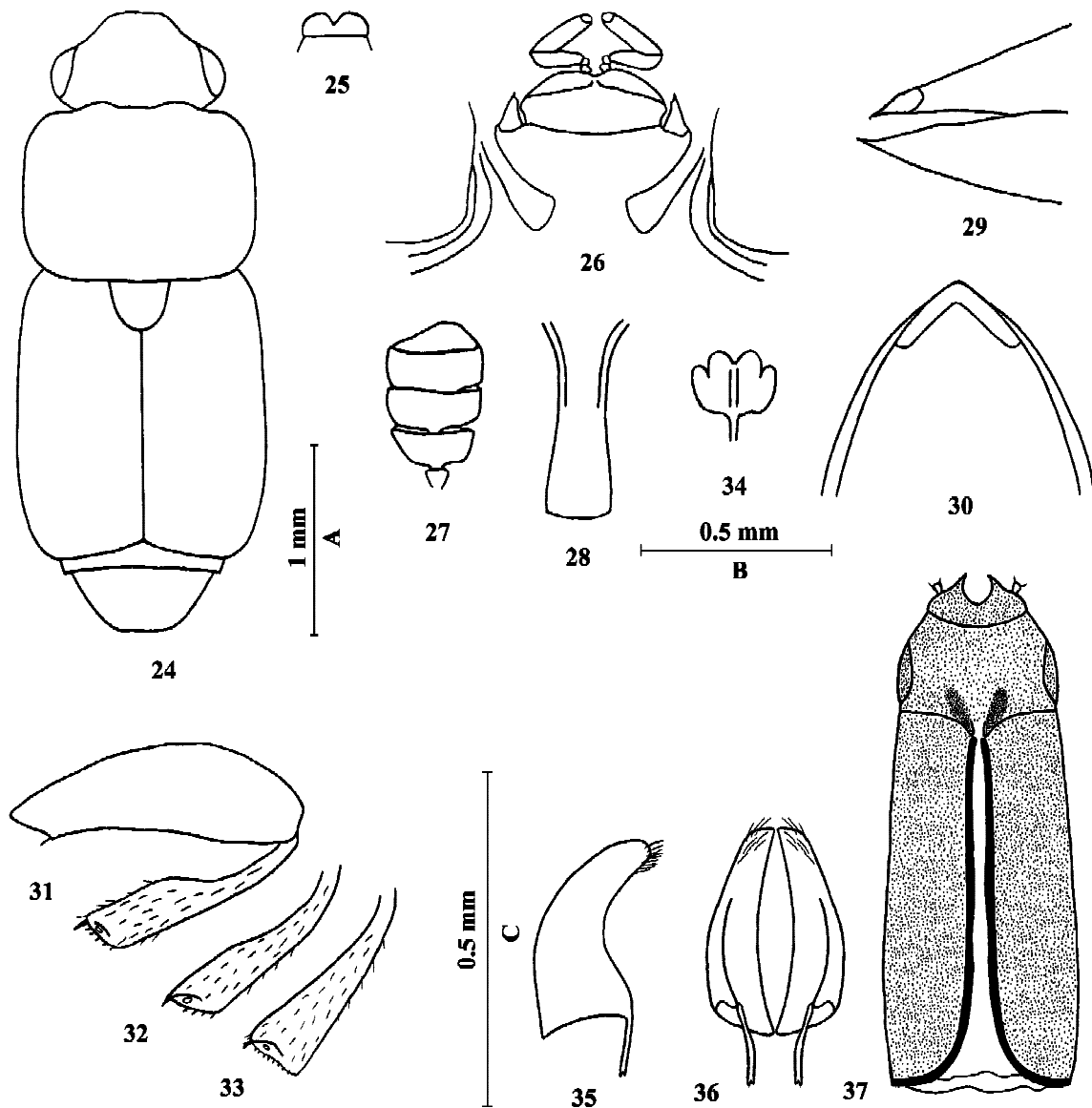
Aedeagus heavily sclerotized. Ventral plate with very short lateral lobes.

**Female.** Pygidium angular to widely rounded and not elevated at apex and bearing a pore at each side of apex visible dorsally, hypopygidium widely rounded at apex.

Protarsus 1/3 as wide as protibiae. Ovipositor moderately sclerotized.

**Variations.** Length 2.5–3.3, breadth 1.3–1.7, height 0.7–0.9 mm. Many paratypes are more or less darker than the holotype. A small variability is observed in puncturation and sculpture of integument. The female pygidium shows some variability of shape of its apex, up to the widely rounded apex.

**DIAGNOSIS.** This new species is characterized by the comparatively long tarsi. It is most similar to *N. (s.str.) ophthalmicus* (type species of the subgenus), in many external



Figs 24–37. *Nitops (s.str.) modicus* sp.n.: 24 — male body; 25 — fore part of head with labrum; 26 — surface of head with a contour of antennal grooves, maxillary and labial palpi; 27 — antennal club; 28 — prosternal intercoxal process; 29 — apex of female abdomen; 30 — female pygidium; 31 — male metafemur and tibia; 32 — male mesotibia; 33 — male protibia; 34 — ventral plate and *spiculum gastrale* of male; 35–36 — tegmen; 37 — ovipositor; 24–25, 30–33 — dorsal; 26, 28, 36–37 — ventral; 29, 35 — lateral. Scales: A to Fig. 24; B to Figs. 25, 34; C to Figs. 26–33, 35–37.

Рис. 24–37. *Nitops (s.str.) modicus* sp.n.: 24 — самец, контур тела; 25 — передняя часть головы с верхней губой; 26 — поверхность головы с контурами усиковой ямки, челюстных и губных щупиков; 27 — булава усика; 28 — межтазиковый отросток переднегруди; 29 — вершина брюшка самки; 30 — пигидий самки; 31 — задние бедро и голень самца; 32 — средняя голень самца; 33 — передняя голень самца; 34 — вентральная пластинка и *spiculum gastrale* самца; 35–36 — тегмен; 37 — яйцеклад; 24–25, 30–33 — сверху; 26, 28, 36–37 — снизу; 29, 35 — сбоку. Масштаб: А для Рис. 24; В для Рис. 25, 34; С для Рис. 26–33, 35–37.

characters and particularly in the sexual dimorphism of legs, although differs from it in the somewhat smaller eyes (combined width about half of distance between eyes, but not 2/3), shape of the male metafemur (widest before the middle) and female pygidium (leaving uncovered stripe between pores). The new species under consideration is also rather similar to *Nitops* (s.str.) *curvipes* (Sharp, 1889) and *N.* (s.str.) *languidus* (Erichson, 1843), **comb. nov.**, but differs from the first in the somewhat darker and smaller body, not so relief sculpture of the dorsum, longer and more conspicuous dorsal pubescence, somewhat longer elytra, different shape of male metatibia and shape of tegmen; and from the second in the more or less concave posterior edge of the male femora (particularly metafemur), wider and dilated in distal half male pro- and mesotibiae, lack of long process in the middle of inner edge of metatibia, narrower male protarsus, lack of median subapical depression without hairs on male hypopygidium, shape of male ventral plate, more gently curved and narrower tegmen. Besides, *N.* (s.str.) *modicus* **sp.n.** rather resembles *N.* (s.str.) *concolor* (Sharp, 1889), differing from the latter in the somewhat darker and more robust body, longer antennae, shorter elytra, more or less concave posterior edge of male femora (particularly metafemur), wider and dilated in distal half male tibiae (particularly metatibia), narrower male protarsus, longer lateral branches of male ventral plate, shape of tegmen; and also the new species differing from *N.* (s.str.) *craigheadi* (Dobson, 1972), **comb. n.** (according to the paratypes deposited in BMNH examined) and *N.* (s.str.) *megalops* (Dobson, 1972), **comb. n.** (according to the holotype in BMNH examined) in the much wider and more robust body, smaller eyes consisting of smaller facets (distance between eyes about as great as combined width of eyes), shallower, finer and denser dorsal puncturation, much relief sculpture on interspaces between punctures on dorsum, different outline of labral lobes (not subtruncate), much denser, longer and much more conspicuous dorsal pubescence, longer ultimate labial palpomeres, much more widened apex of prosternal process, sexual dimorphism in tibiae, widely angular and flattened apex of female pygidium with wider terminal stripe between pores.

The new species under consideration also differs from:

— *N.* (s.str.) *crassus* (Sharp, 1889) (according to the type male and female in BMNH) in the less convex dorsum, lighter body coloration, pronotum not widest at base, but with more arcuate sides and posterior angles not projecting posteriorly, coarser dorsal puncturation and more relief sculpture on interspaces between punctures, longer and much more conspicuous pubescence, much shorter and more compact antennal club and much wider apex of the female pygidium;

— *N.* (s.str.) *distinctus* (Reitter, 1873), **comb. nov.** (according to the type specimens in NMW) in the somewhat darker and much more robust body, longer and more conspicuous dorsal pubescence, markedly smaller eyes, much shorter elytra, more or less concave posterior edge of the male femora (particularly metafemur), wider and dilated in distal half male tibiae (particularly metatibia), wider protarsus, longer lateral branches of the male ventral plate, much shorter and wider tegmen.

— *N.* (s.str.) *ochraceus* (Erichson, 1843), **comb. nov.** in the somewhat darker, oval and much more robust body, shorter pubescence, markedly denser and finer puncturation on dorsum, distinct microsculpture on interspaces between punctures on dorsum, markedly smaller eyes, much shorter elytra, more or less concave posterior edge of male femora (particularly metafemur), wider and dilated in distal half male tibiae (particularly metatibia), lack of median subapical depression without hairs on the male hypopygidium, longer lateral branches of the male ventral plate, much shorter and wider tegmen;

On the other hand, it can be compared with the Indo-Malayan *N.* (s.str.) *pubescens* Murray, 1864, but differs from it in the darker legs (subunicolorous with body), smaller eyes, shorter tegmen with wider lateral lobes, less projecting and less acute apex of the female pygidium.

**ETYMOLOGY:** The name of this new species means “moderate”, “modest”, “middle”, “medium” etc.

***Nitops* (*Nitops*) *pilosocerei* Kirejtshuk et Kurochkin **sp.n.**  
Figs 38–56.**

**MATERIAL.** Imagines: holotype, male (MNRJ) and 18 paratypes (MNRJ and ZIN) — “Parque Nacional da Restinga de Jurubatiba, Macae, Rio de Janeiro State, 15.03.1991”, “on flowers of *Pilosocereus arrabidaei* (Lem.) Byles et G.D. Rowley”; larvae: 9 spec. (MNRJ and ZIN) with the same labels; 7 paratypes (MNRJ and ZIN) — *ibid.*, “5.09.2005”, on flowers of the same species; 9 paratypes (MNRJ and ZIN) — *ibid.*, “7.03.2005”, on flowers of the same species; 24 paratypes (BMNH, MNRJ, ZIN and ZMB) — *ibid.*, “15.05.2002”, on flowers of the same species.

**ADULTS:** Figs 38–49.

**Male (holotype).** Length 3.3, breadth 1.6, height 0.9 mm. Rather convex dorsally and ventrally; dorsum dark brown, but underside and appendages reddish brown, eyes lighter; dorsum dull and underside with slight fat shine; dorsum with very conspicuous yellowish golden subrecumbent hairs, about 1.5 times as long as distance between their insertions.

Head and pronotum with regular and not quite distinct punctures, about 1/2 as large as eye facets in diameter, interspaces between punctures somewhat greater than puncture diameter, very densely, reliefly and very finely cellularly microreticulated. Elytra with almost distinct punctures, about as large as those on head and pronotum, and interspaces between them much broader and with rather contrasting and fine cellular microreticulation. Uncovered tergites with smaller but almost distinct punctures than those on head and pronotum, but interspaces between punctures yet broader and reliefly microreticulated. Surface of prosternum with slightly more sparse, fine and not quite distinct punctures than those on head and pronotum; interspaces between them somewhat smoothly and cellularly microreticulated. Surface of metasternum, prosternal process and ventrites somewhat similar to that on head and pronotum, but punctures larger and more sparse, interspaces between them somewhat smoothed.

Head somewhat shorter distance between eyes (composed of rather large facets), slightly convex to flat (distance between eyes about 2/3 as broad as combined width of eyes). Labrum with subtruncate apices of lobes, moderately exposed forwards (almost 1/2 as long as their combined width), median excision moderately deep and broad. Mandibles slightly exposed. Antennae markedly shorter than head breadth, their club compact, comprising about 3/8 of total antennal length, somewhat more than 1 and 1/4 as long as wide, scape nearly 1/2 as long as club, antennomere 2 about as long as antennomere 3 and twice longer antennomere 4. Pronotum more acute anteriorly than posteriorly, moderately vaulted at disk and steeply sloped at unexplanate sides, with slightly convex anterior and posterior edges, base with distinct and moderately thick border, anterior and posterior angles widely rounded. Scutellum subpentagonal and rounded at apex. Elytra about 11/12 as long as their combined width, steeply sloped at extremely narrowly explanate sides. Pygidium with moderately extended and subtruncate apex.

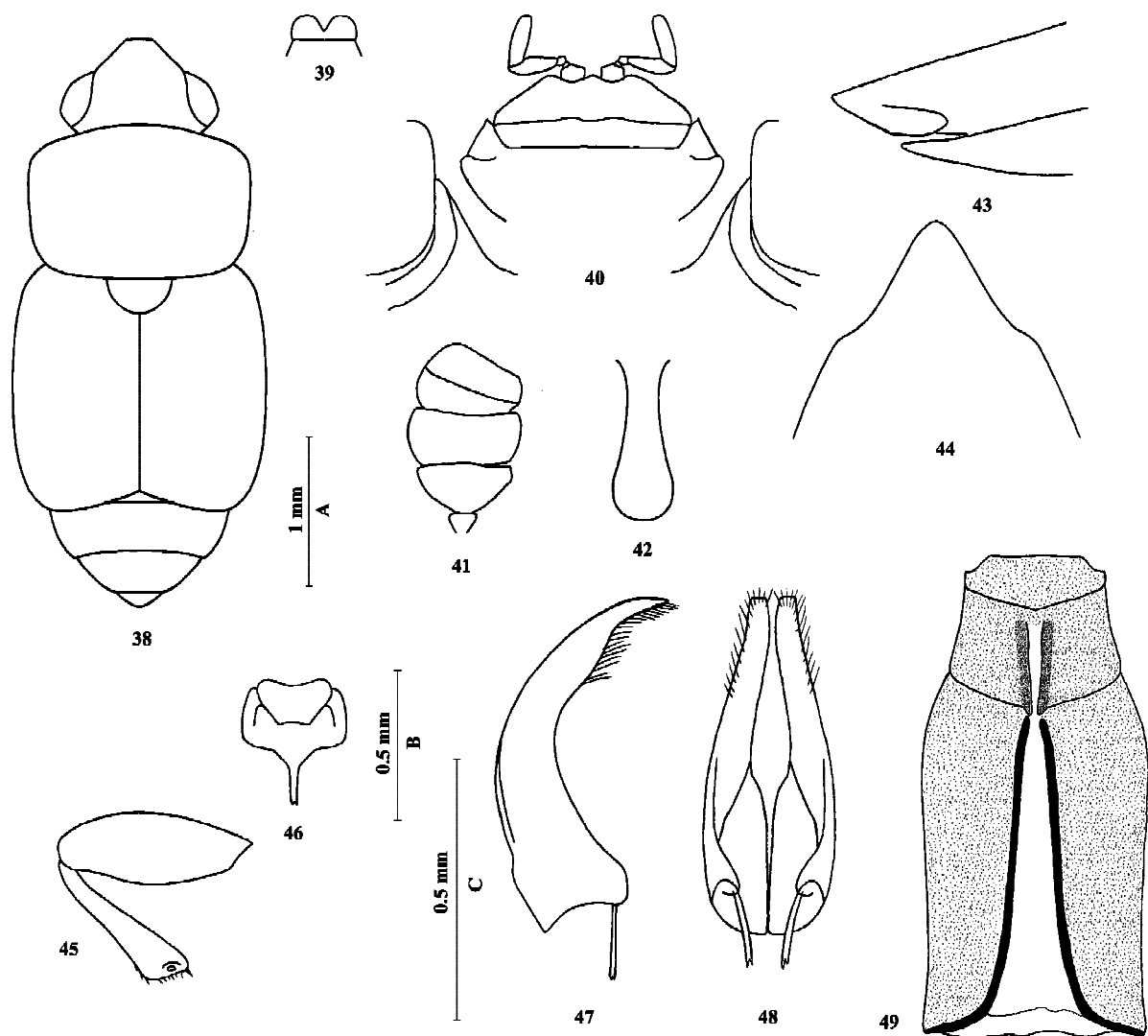
Mentum about 2.5 times as wide as long. Last labial palpomere about 3.5 times as long as wide. Antennal grooves



deeply and almost rectilinearly convergent behind mentum but not joining, with sharply raised inner and outer edges, outer edge divided into a continuation of antennal groove and parocular groove. Distance between procoxae about 1/2 times as great as that between metacoxae and nearly twice greater than that between mesocoxae. Prosternum with a distinct groove along anterior edge and with process rather curved along coxae, slightly widened before widely rounded apex, which 3/5 as wide as antennal club. Mesosternum deeply excavate and simple. Metasternum flattened with distinct median suture, its posterior edge between coxae deeply and nearly arcuately excised. Submesocoxal lines follow closely posterior edge of cavities and strongly deviated at anterior

corners of metasternum. Ventricle 1 almost as long as hypopygidium and as long as ventrites 2-4 combined. Hypopygidium with moderately excised apex (bottom of excision rather flat) and with weak but quite clear triangular smooth depression without hairs before the middle of excision.

Tibiae simple and subtriangular, about as wide as antennal club, their inner edge almost straight, outer edge of meso- and metatibiae with moderate setae. Femora of usual configuration, about 1.5 times as wide as corresponding tibiae, metafemur with moderately convex posterior edge. Tarsi about 2/3 as long as protibia, protarsi 3/5 as wide as protibiae, meso- and metatarsi narrower, claws simple.



Figs 38-49. *Nitops* (s.str.) *pilosocerei* sp.n.: 38 — male body; 39 — fore part of head with labrum; 40 — surface of head with a contour of antennal grooves, maxillar and labial palpi; 41 — antennal club; 42 — prosternal intercoxal process; 43 — apex of female abdomen; 44 — female pygidium; 45 — male metafemur and tibia; 46 — ventral plate and *spiculum gastrale* of male; 47-48 — tegmen; 49 — ovipositor; 38-39; 44-45 — dorsal; 40, 42, 48-49 — ventral; 43, 47 — lateral. Scales: A to Fig. 38; B to Figs 39, 46; C to Figs 40-45, 47-49.

Рис. 38-49. *Nitops* (s.str.) *pilosocerei* sp.n.: 38 — самец, контур тела; 39 — передняя часть головы с верхней губой; 40 — поверхность головы с контурами усиковой ямки, челюстных и губных щупиков; 41 — булава усика; 42 — межтазиковый отросток переднегруди; 43 — верхина брюшка самки; 44 — пигидий самки; 45 — задние бедро и голень самца; 46 — вентральная пластинка и *spiculum gastrale* самца; 47-48 — тегмен; 49 — яйцеклад; 38-39, 44-45 — сверху; 40, 42, 48-49 — снизу; 43, 47 — сбоку. Масштаб: А для Рис. 38; В для Рис. 39, 46; С для Рис. 40-45, 47-49.

Aedeagus heavily sclerotized. Ventral plate without clear lateral lobes.

**Female.** Pygidium acute, rather projecting and somewhat elevated at apex and bearing a pore at each side of apex, hypopygidium rounded at apex. Protarsus 1/3 as wide as protibiae. Ovipositor moderately sclerotized.

**Variations.** Length 2.5–3.7, breadth 1.4–1.8, height 0.7–0.9 mm. Most paratypes are about as dark as the holotype, although some paratypes with almost reddish underside and appendages. Pronotum is somewhat variable, in larger males it is somewhat larger and wider elytra, while in small ones and females it somewhat smaller and about as wide as elytra. A small variability is observed in punctuation and sculpture of integument.

**DIAGNOSIS.** This new species belongs to the group with the more or less oval and more robust body, and also with the moderately sized eyes. It distinct from:

— *Nitops* (s.str.) *crassus* (Sharp, 1889) (according to the type male and female in BMNH) in the less convex dorsum, pronotum not widest at base, but with more arcuate sides and posterior angles not projecting posteriorly, coarser dorsal punctuation and more relief sculpture on interspaces between punctures, much more conspicuous pubescence, much shorter, much wider and more compact antennal club, wider all tibiae in both sexes, acuminate and somewhat explanate apex of female pygidium;

— *N.* (s.str.) *curvipes* (Sharp, 1889) (according to the type male and female in BMNH) in the darker, smaller and slender body with shorter abdomen, not so small eyes, much larger antennal club, lack of clearly sexual dimorphism in tibiae and femora (tibiae slightly curved and posterior edges of femora somewhat convex in both sexes), wider protarsus, clear but shallow median depression without hairs at bottom of apical excision of male hypopygidium, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor;

— *N.* (s.str.) *languidus* (Erichson, 1843), **comb. nov.** (according to the type male and female in ZMB) in the darker, larger and slender body, shorter elytra with not so deep sutural angle, much larger antennal club, lack of clearly sexual dimorphism in tibiae (metatibia slightly curved in both sexes and without long process at the middle of inner edge), wider protarsus, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor;

— *N.* (s.str.) *modicus* **sp.n.** in the somewhat darker and shorter body, shorter and more conspicuous hairs on dorsum, much larger antennal club, clear but shallow median depression without hairs at bottom of apical excision of male hypopygidium, somewhat shorter wider protarsus, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of both sexes particularly, truncate apex of ovipositor;

— *N.* (s.str.) *palmatus* (Sharp, 1889) (according to the type male and female in BMNH) in the somewhat darker and shorter body, shorter and more conspicuous hairs on dorsum, lack of posterior angles of pronotum, shorter elytra, shorter portion of exposed abdomen, much larger and not subtriangular antennal club, shorter last abdominal segment, wider tibiae, clear but shallow median depression without hairs at bottom of apical excision of male hypopygidium, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor;

— *N.* (s.str.) *piger* Murray, 1864 (according to the type male and female in BMNH) in the somewhat darker and shorter body, shorter and more conspicuous hairs on dorsum, longer last abdominal segment, clearly widened apex of prosternal process, much longer last labial palpomere, shape

of male ventral plate and genitalia of both sexes, particularly truncate apex of ovipositor;

— *N.* (s.str.) *sordidus* (Erichson, 1847), **comb. nov.** (according to the type male and female in ZMB) in the somewhat darker body, much shorter and more conspicuous hairs on dorsum, wider antennal club, shorter last abdominal segment, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of male, although the ovipositor of both is with truncate apex);

— *N.* (s.str.) *vitraci* (Grouvelle, 1902) **comb. nov.** (according to the type male and female in MNHN) in the somewhat darker, subunicolorous, smaller and more robust body, well developed pubescence (integument of *N. vitraci* nearly glabrous), much shorter elytra, somewhat shorter antennal club, wider tibiae, clear but shallow median depression without hairs at bottom of apical excision of male hypopygidium, very acuminate apex of female pygidium, shape of male ventral plate and genitalia of both sexes, particularly, truncate apex of ovipositor.

**ETYMOLOGY:** The Latin name of this new species is derived from the generic name of cactus *Pilosocereus* in flowers of which both active instars occur.

**MATURE LARVA:** Figs 50–56.

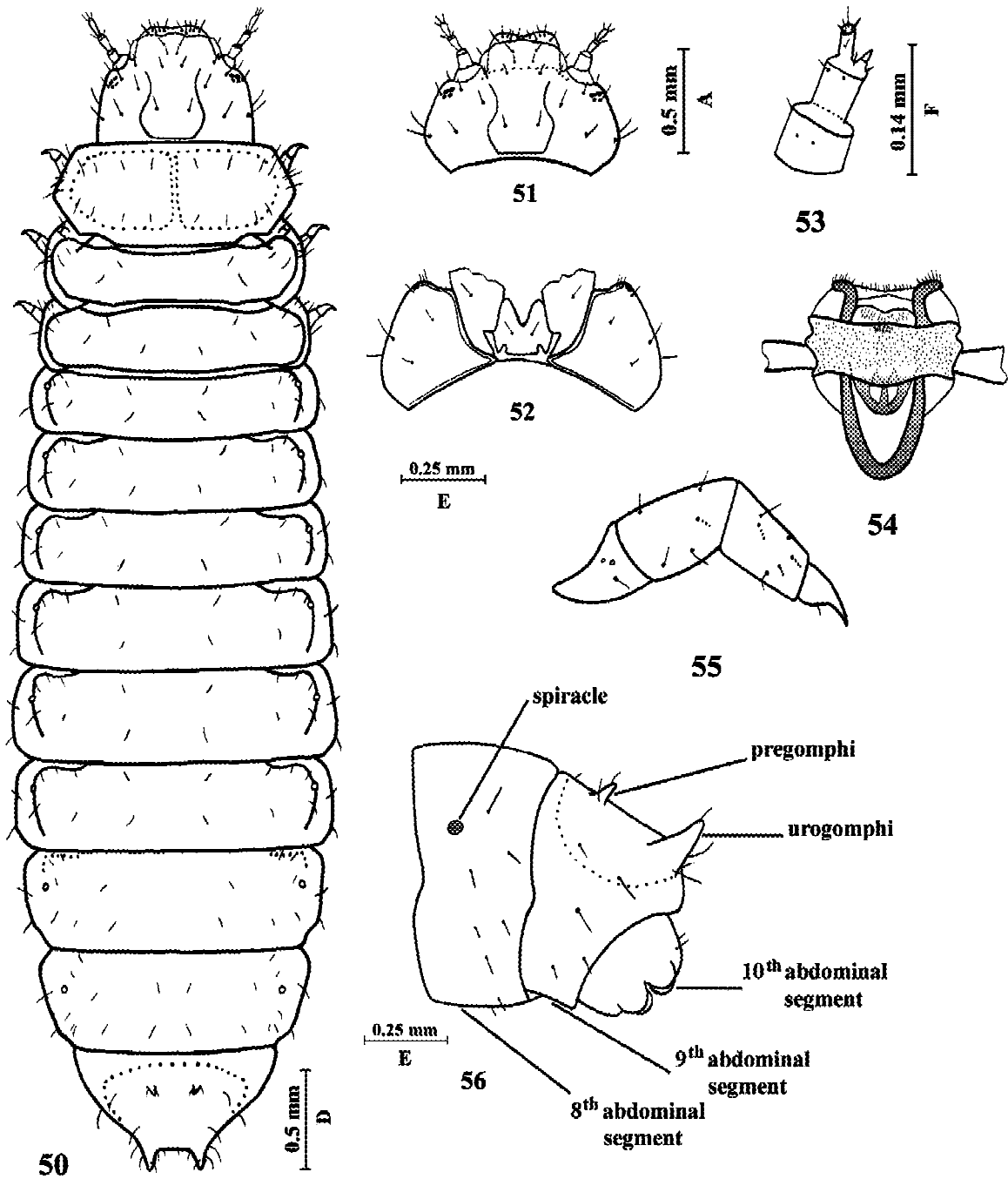
**DESCRIPTION.** Body length 5.05–5.95 mm (with urogomphi), breadth 1.59–1.55 mm. Head capsule length 0.40–0.50 mm, breadth 0.45–0.73 mm. Body rather strongly elongate, widened medially, subdepressed dorsally and ventrally, slightly shining dorsally, with thoracic and abdominal terga to abdominal tergum VIII without tubercles, creamy-white, except head capsule, spiracles, legs, pregomphi and urogomphi, all being brown to light brown. Anterior pair of ocelli black and posterior ones brownish. Head capsule, legs, urogomphi and pregomphi shining. Cervical region membranous (becoming visible after processing in the KOH solution). All setae very pale, comparatively short and slightly distinguishable.

Head capsule with labrum fused with frons, somewhat protracted into prothorax (characteristic of alive specimens); frontal sutures finely impressed and curved smoothly inwards anteriorly; vertex with elongate subparamedian longitudinal and rather shallow impressions somewhat broadened posteriorly. Head capsule gently widened near its base (characteristic of alive specimens) or moderately widened submedially (after processing in KOH), posterior edge of head capsule moderately emarginate, with 2 pairs of larger anterior ocelli and with 2 pairs of posterior ocelli reduced to small spots. Vertex with 2 large median setae, 2 submedian setae, 2 small anteriomedian setae, 2 large setae externally frontal sutures, 2 very small setae near a base of each antenna, 2 setae at each group of ocelli, and 2 large posterolateral setae. Frons with 6 small medial setae. Labrum with moderately excised anterior margin, has 4 small medial setae, 4 larger setae at its edge and 2 large posterolateral setae. External edge of mandibles visible from above. Ventral surface of head capsule with the same chaetotaxy as in preceding species, but additionally with 3 small setae located anteriorly from each group of ocelli. Hypopharyngeal sclerome as illustrated, looking like that in *N.* (s.str.) *cerei* **sp.n.**

Prothorax with well expressed lateral angles, posterior edge of prothorax with a pair of not wide emarginations. Meso- and metathoraces with posterior edges as shown in Fig. 50. Protergum with 10 lateral setae and consisting of two moderately sclerotized, large and shining transverse plates, each of them with 3 anterior, 3 posterior and 2 lateral setae. Mesotergum without sclerotized plates and bears 2 anterosubmedian, 2 anterosublateral, 2 submedian, 2 sublateral and 4 lateral setae. Mesothoracic spiracular sclerites well developed and conspicuously protruding and each with 2 small setae; spiracular tube well developed. Metatergum without sclero-

tized plates, with 2 anterosubmedian, 2 anterosublateral, 2 submedian setae, 2 sublateral and 4 lateral setae. Metathoracic spiracular sclerites small and each with 2 small setae. Abdomen with 9 segments subequal in size. Tergum of each of segments 1–2 with 2 anterosubmedian, 2 posterosubmedian, 2 anterosublateral, 2 posterosublateral setae, 2 small setae anteriorly from each spiracle, a large seta posteriorly each spiracle,

2 large posterolateral setae. Tergum of segment 3 with 2 anterosubmedian, 2 posterosubmedian, 2 anterosublateral, 2 posterosublateral setae, a large seta posteriorly from each spiracle, 2 sublateral, and 2 large posterolateral setae. Tergum of each of segments 4–6 with the same setae as terga of segments 1–2, but they additionally with 2 small sublateral setae. Tergum of segment 7 with 2 anterosubmedian, 2 poster-



Figs 50–56. *Nitops* (s.str.) *pilosocerei* sp.n.: 50 — mature larva; 51–52 — head (after KOH treatment); 53 — antenna, right; 54 — hypopharynx; 55 — metathoracic leg; 56 — apex of abdomen; 50–51, 54 — dorsal; 52–53 — ventral; 55 — posterior; 56 — lateral. Scales: D to Figs 50–51; E to Figs 52, 56; F to Figs 53–55.

Рис. 50–56. *Nitops* (s.str.) *pilosocerei* sp.n.: 50 — взрослая личинка; 51–52 — голова (после очистки KOH); 53 — правая антенна; 54 — гипофаринкс; 55 — задняя нога; 56 — вершина брюшка; 50–51, 54 — сверху; 52–53 — снизу; 55 — сзади; 56 — сбоку. Масштаб: D для Рис. 50–51; E для Рис. 52, 56; F для Рис. 53–55.



Figs 57–60. Habitats of *Nitops* species: 57 — type locality of *Nitops* (s.str.) *cerei* sp.n., *N.* (s.str.) *modicus* sp.n. and *N.* (s.str.) *pilosocerei* sp.n. with cacti of *Cereus fernambucensis* Lem.; 58–59 — flowers of *Cereus fernambucensis* Lem.; 60 — flower of *Pilosocereus arrabidaei* (Lem.) Byles et G.D. Rowley.

Рис. 57–60. Местобитания блестянок *Nitops*: 57 — типовые местонахождения *Nitops* (s.str.) *cerei* sp.n., *N.* (s.str.) *modicus* sp.n. и *N.* (s.str.) *pilosocerei* sp.n. и кактус *Cereus fernambucensis* Lem.; 58–59 — цветы *Cereus fernambucensis* Lem.; 60 — цветок *Pilosocereus arrabidaei* (Lem.) Byles et G.D. Rowley.

omedian, 2 small anterosublateral setae near each spiracle, a small seta near each spiracle, a larger seta posteriorly from each spiracle, 2 very small posterosublateral, 2 large sublateral, and 2 large lateral setae. Tergum of segment 8 with 2 anteromedian, 2 larger anterosublateral, 2 posteromedian, 2 posterosubmedian setae, 2 small setae anteriorly from each spiracle, a large seta behind each spiracle, 2 very small setae at each posterior corner of tergum, 2 large sublateral setae, and 2 large lateral setae. Tergum of segment 9 with 2 large lateral setae, with moderately sclerotized, large and shining caudal plate with 4 large sublateral setae. Tergum of segment 9 with 8 large lateral setae, with moderately sclerotized, large and shining caudal plate angularly medially emarginate, with 2 small anteromedian and 4 small sublateral setae. Segment 9 with well developed, rather short, moderately separated and almost sharply-pointed urogomphi, with their apices slightly bound upwards, each with an apical seta on its dorsal surface, a large seta at base, and a subapical seta on its ventral surface, edge between urogomphi almost straight; well developed, paired, rather moderately separated and small pregomphi with almost pointed apices, slightly bound upwards, each of the latter with a seta basally and a subapical seta. Abdominal segment 10 moderately developed and not exposed dorsally. Spiracles present on mesotho-

rac spiracular sclerites and anterosublaterally on segments 1–8. Spiracles of normal size, moderately sclerotized, annular-biforous and oval, slightly projecting above the body surface.

Legs almost the same as in the preceding species, but tarsungulus slightly longer than that in *N.* (s.str.) *?cerei* sp.n., distinctly widened at base, with moderately curved and sharp tip, and with a small ventral seta. The rest microstructures of both species do not show any clear difference.

DIAGNOSIS. (see the diagnosis to *N.* (s.str.) *?cerei* sp.n. larva above).

VARIABILITY. Some variability was observed in size and number of teeth at outer edge of mola of the left mandible of the larvae of both new species.

#### KEY TO KNOWN MATURE LARVAE OF THE GENUS *NITOPS*

- 1 (2) Only prothorax with paired transverse sclerotized plates, each urogomphus without a setibearing tubercle on its posterior surface ..... 2
- 2 (1) Pro-, meso- and metathorax with paired sclerotized plates; each sclerotized plate of prothorax with 2 anterior, 2 posterior and 2 lateral setae; each urogomphus with a setibearing tubercle on its posterior surface; frons with 2 small medial setae; vertex with 2 larger setae externally

- frontal sutures and a smaller seta near each of them. In flowers of *Cereus fernambucensis* ..... *N. (Nitops) ?cerei* **sp.n.**
- 2 (3) Each sclerotized plate of prothorax with 3 anterior, 3 posterior and 2 lateral setae; frons with 6 small medial setae; vertex with 2 large setae externally frontal sutures and without small seta near each of them. In flowers of *Pilosocereus arrabidae* ..... *N. (Nitops) pilosocerei* **sp.n.**
- 3 (2) Each sclerotized plate of prothorax with 4 anterior, 4 posterior and 2 lateral setae; frons with 4 small medial, 2 small sublateral and 2 large submedial setae; vertex with 2 large setae externally frontal sutures. In flowers of *Opuntia opuntia* ..... *N. (Urocarpolus) floralis* (Er.)

### Discussion and notes on bionomy

The only publication contains a description of the third-instar larva of the genus *Nitops* — *Nitops (Urocarpolus) floralis* (Connell, 1957). In this publication W.A. Connell drew the whole body of the larva with the head capsule in dorsal and ventral views, and apex of the body in dorsal and lateral views but he did not illustrate their microstructures which would be highly valuable for their identification. Besides, he gave a key to some species of Nitidulidae including some Carpophilinae species such as *N. (U.) floralis*. To separate some larvae of Carpophilinae he used mainly such characters as presence or absence of the “paired meso- and metanotal sclerites”, the shape of urogomphi and body chaetotaxy. These characters rather quite acceptable for identification of the mature larvae of the genus *Nitops*, except probably for the shape of urogomphi, because the examination of larval microstructures in the new species here described did not yield any clear difference. But the chaetotaxy of the dorsal surface of the head is somewhat peculiar in the larvae of the species here described and also could be used in identification key. However, in the description of the third-instar larva of *N. (U.) floralis* Connell noted that “Small meso- and metanotal sclerites faintly indicated in some specimens.” but later in a key to the larvae of some Nitidulidae, particularly, Carpophilinae, he wrote “Meso- and metanotal sclerites absent” for *N. (U.) floralis* that goes contrary to his above cited phrase and probably can presumably be used in composing of the identification key for only 2 new species, not for all larvae of the genus *Nitops*. In the specimens examined these “sclerites” [after Connell, 1957] or sclerotized plates are distinctly expressed in *N. (s.str.) ?cerei* larvae and are not found in *N. (s.str.) pilosocerei* ones, and this difference seems to be quite characteristic of them. Connell made some observations on the host-plant of *N. (U.) floralis*. Larvae of this species were observed by him to develop strictly in flowers of *Opuntia opuntia*. Larvae of two newly described species were also collected in flowers of Cactaceae (*Cereus fernambucensis* Lemaire, 1839 and *Pilosocereus arrabidae* (Lemaire) Byles et G.D. Rowley, 1957). Mature larvae of two new species here described demonstrate a very strong similarity despite their imagines possess many characters for their discrimination.

### On composition of the subgenus *Nitops* Murray, 1864 sensu stricto

The taxon *Nitops* was redescribed and briefly defined by A.G. Kirejtshuk [1997], however, in this publication was not discussed the composition of it and revision of its members. Therefore, it is necessary to outline the list of the members of this subgenus and make some notes on composition and placements of the species, which were put in this group, although their attribution should get another interpretation.

#### Subgenus *Nitops* Murray, 1864 = *Nitops* Murray, 1864: 382.

Type species: *Carpophilus (Nitops) ophthalmicus* Murray, 1864: 383, subsequent designation by Kirejtshuk, 1997.

= *Endomerus* Murray, 1864: 382 (synonymized by Grouvelle, 1913).

Type species: *Carpophilus (Endomerus) piger* Murray, 1864: 384, here designated.

- *Nitops (Nitops) cerei* **sp.n.**;
- *Nitops (Nitops) concolor* (Sharp, 1889) (*Carpophilus concolor* Sharp, 1889: 298);
- *Nitops (Nitops) craigheadi* Dobson, 1972, **comb. n.** (*Carpophilus craigheadi* Dobson, 1972: 145);
- *Nitops (Nitops) crassus* (Sharp, 1889) (*Carpophilus crassus* Sharp, 1899: 297);
- *Nitops (Nitops) curvipes* (Sharp, 1889), **comb. n.** (*Carpophilus curvipes* Sharp, 1899: 299);
- *Nitops (Nitops) distinctus* (Reitter, 1873), **comb. n.** (*Carpophilus distinctus* Reitter, 1873: 177);
- *Nitops (Nitops) megalops* Dobson, 1972, **comb. n.** (*Carpophilus megalops* Dobson, 1972: 149);
- *Nitops (Nitops) modicus* **sp.n.**;
- *Nitops (Nitops) languidus* (Erichson, 1843), **comb. n.** (*Carpophilus languidus* Erichson, 1843: 261);
- *Nitops (Nitops) ochraceus* (Erichson, 1843), **comb. n.** (*Carpophilus ochraceus* Erichson, 1843: 260);
- *Nitops (Nitops) ophthalmicus* Murray, 1899 (*Carpophilus (Nitops) ophthalmicus* Murray, 1899: 383);
- *Nitops (Nitops) palmatus* (Sharp, 1899) (*Carpophilus palmatus* Sharp, 1899: 396);
- *Nitops (Nitops) piger* Murray, 1899 (*Carpophilus (Endomerus) piger* Murray, 1899: 384);
- *Nitops (Nitops) pilosocerei* **sp.n.**;
- *Nitops (Nitops) pubescens* Murray, 1864 [*Carpophilus (Nitops) pubescens* Murray, 1864: 385];
- *Nitops (Nitops) sordidus* (Erichson, 1847), **comb. n.** (*Carpophilus sordidus* Erichson, 1847: 92);
- *Nitops (Nitops) vitraci* (Grouvelle, 1902) **comb. n.** (*Carpophilus Vitraci* Grouvelle, 1902: 757).

Species of the subgenus *Nitops* distributed in Central and South America can be split into two groups. Members of the first group (*ophthalmicus*-group of species) are characterized by more or less subparallel-sided and more slender body, large eyes, and includes the following species: *N. (s.str.) cerei* **sp.n.**; *N. (s.str.) concolor*; *N. (s.str.) distinctus*, **comb.n.**; *N. (s.str.) craigheadi*, **comb.n.**; *N. (s.str.) megalops*, **comb.n.**; *N. (s.str.) ochraceus*, **comb.n.** and *N. (s.str.) ophthalmicus*. Representatives of the second group (*piger*-group of spe-

cies) can be distinguished from species of the first one due to more or less oval and more robust body, moderately sized eyes. They are: *N. (s.str.) crassus*; *N. (s.str.) curvipes*, **comb.n.**; *N. (s.str.) languidus*, **comb.n.**; *N. (s.str.) modicus* **sp.n.**; *N. (s.str.) palmatus*; *N. (s.str.) piger*; *N. (s.str.) pilosocerei* **sp.n.**; *N. (s.str.) sordidus*, **comb.n.** and *N. (s.str.) vitraci*, **comb.n.** A rather secluded position has *Nitops (Nitops) pubescens* Murray, 1864 known from the Indo-Malayan Region and somewhat similar to the *piger*-group of species.

#### *Incertae sedis:*

*Carpophilus (Nitops) dohrni* Reitter, 1876: 308. The type series of this species seems to be lost as the most specimens of the Dohrn's collection during the Second World War. The Reitter's [1876] description of this species is rather superficial and mentions the characters, which could be applied to many species of the genus *Nitops*, although *C. (s.str.) dohrni* seems to share some similarities with *N. (s.str.) ophthalmicus* and *N. (s.str.) sordidus*, thus, it could be provisionally put it in the *piger*-group of the subgenus *Nitops* (group II).

*Carpophilus (Nitops) crassicolis* Reitter, 1873: 177. The type specimens of this species remain unknown to the authors. Although Nitidulidae collections in Berlin (ZMB), London (BMNH) and Münchenberg (DEIM) were thoroughly studied by the senior author and no type specimens of *C. (s.str.) crassicolis* were found there. However, Nitidulidae in München and Genève (Musée d'Histoire Naturelle) were not checked properly and, the type specimens from the Schaum collection could be deposited there. Reitter's [1873] description of this species is very short and makes hardly possible a reliable recognition of them, although *C. (s.str.) crassicolis* was considered by him as very close species to *N. (s.str.) ophthalmicus* and *N. (s.str.) distinctus*. From the characters mentioned by the descriptor in this comparison most valuable are pronotum subequal in width to elytra and elytra about 1.5 times as long as pronotum (about 2 times for *C. (s.str.) ophthalmicus*), and, therefore, this species could provisionally be placed in the *piger*-group of the subgenus *Nitops* (group II).

#### On position of some *Carpophilus* species regarded in composition of *Nitops*

*Carpophilus (Ecnomorphus) senex* Murray, 1864 [*Carpophilus (Endomerus) senex* Murray, 1864: 384], **comb. nov.** This species (known to the authors after study of the type series deposited in BMNH) should be put into subgenus *Ecnomorphus* Motschulsky, 1858 (if we regard *Carpophilus piger* as a type species of *Endomerus* — see above) because of quite characteristic structure of abdomen of both sexes.

*Carpophilus (Ecnomorphus) ventralis* Sharp, 1899 [*Carpophilus ventralis* Sharp, 1899: 297], **comb. nov.** A Grouvelle [1913] regarded it as *Nitops*. However, *C. (Ecnomorphus) ventralis* (known to the authors only after study of two females from the type series deposited in BMNH) has the structural features characteristic

rather of the subgenus *Ecnomorphus* rather than *Nitops*. The specimens examined have no pore at apex of the female pygidium and their antennal club has the ultimate antennomere widest.

*Taeniolinus weyersi* (Grouvelle, 1900) [*Carpophilus (Nitops) weyersi* Grouvelle, 1900: 262], **comb. nov.** This species is known to the authors after study of the type specimens deposited in MNHN. They have all structural peculiarities of the genus *Taeniolinus* Kirejtshuk, 1998 from the tribe Taenioncini Kirejtshuk, 1998 of the subfamily Epuraeinae (but not Carpophilinae).

#### On biological aspects of some *Nitops* species

*Nitops (s.str.) pilosocerei* **sp.n.** is the most frequent and abundant beetle occurring inside the flowers of *P. arrabidae* at the coastal region of Rio de Janeiro State (Brazil). At least 70% of flowers of this cactus species are occupied with this nitidulid species. After two or three days of anthesis (crepuscular and nocturnal) we can find up to adult of 30 *N. (s.str.) pilosocerei* adults per flower (mean = 10 adults / flower, N = 30).

The first beetles get into the flowers through a hole they perforate when the flower buds are still in pre-anthesis (two or three days before the flower anthesis). As soon as they get into the flower they begin to mate and to lay their eggs.

The larvae, up to 20–30 per flower, feed on the petals and, possibly, on the yeasts which grow with the flowers developing and decaying. Yeast community of decaying flowers of *P. arrabidae* was more than 90% composed of *Pichia* sp. and a species similar to *Candida domercqii* (Van der Walt et Van Kerken, 1960) S.A. Meyer et Yarrow, 1978 [Rosa et al., 1994]. It is possible that *N. (s.str.) pilosocerei* **sp.n.** larvae feed mainly on these yeasts and the adults act as their dispersal agents when move from one flower to another in order to feed on their reproductive organs. So we suggest that these beetles and the yeasts, probably, interact as mutualistic species.

In the laboratory (temperature about 23° C), newly hatched larvae of *N. (s.str.) pilosocerei*, collected in spring and summer, spent about 20 days until the emergence of the adults. Pre-pupae abandon the decaying flowers to pupate a few centimeters under the sandy soil of "restinga" habitat. Flowers infested with these beetles seem not to have their potential to product fruits affected.

Besides, *N. (s.str.) pilosocerei* **sp.n.**, immatures of *Neosilba* sp. (Diptera, Lonchaeidae) (personal observation) and *Sigelgaita cerei* Becker (Lepidoptera, Pyralidae) [Monteiro & Becker, 2002], are also very frequent feeders on bud flowers, flowers (both species) and fruits (only the caterpillar species) of *P. arrabidae*. This cactus species is one of the most abundant and largely distributed representative of Cactaceae in the coastal region of Rio de Janeiro State, Brazil [Calvente et al., 2005]. Commonly we can find this cactus species in different phenological phases (bud flowers, flowers and fruits), even in a single individual plant all over the year, but with lower intensity in the summer. *C. fernambucensis* population shows like *P. arrabidae*, several

events of flowering during the year. However, the flowering of this cactus species is just more synchronous and ephemeral than in *P. arrabidae*, being observed frequently almost all population flowering simultaneously, even in the summer. Hence, considering the high abundance and asynchronous phenology of *P. arrabidae* compared with *C. fernambucensis*, it is just much easier to find individuals of *P. arrabidae* flowering than do *C. fernambucensis*.

*N.* (s.str.) *cerei* **sp.n.** [or mixture of 2 species: *N.* (s.str.) *cerei* **sp.n.** and *N.* (s.str.) *modicus* **sp.n.**], both larvae and adults, show similar behaviour and biology in relation to its congeneric species *N.* (s.str.) *pilosocerei* **sp.n.** Adults of these species get into the flowers of *C. fernambucensis* as soon as the flowers start the anthesis. Different from *N.* (s.str.) *pilosocerei* **sp.n.**, we did not observed *N.* (s.str.) *cerei* or *N.* (s.str.) *modicus* **spp.n.** beetles perforating bud flowers before their anthers. However, flowers of this cactus species were observed in a much lower frequency and in a more discontinuous way than *P. arrabidae*. This pattern of *C. fernambucensis* flowering possibly results in several month during the year without flowers available to be colonized by *N.* (s.str.) *cerei* or *N.* (s.str.) *modicus* **spp.n.** beetles. *C. domercqii* was the dominant yeast isolated from flowers of *C. fernambucensis* infested with *N.* (s.str.) *cerei* or *N.* (s.str.) *modicus* **spp.n.** adults and larvae [Rosa et al., 1994]. *C. fernambucensis* flowers are also frequently visited (but not observed reproducing) by *Cyclocephala laminata* Burmeister, 1847 (Coleoptera, Scarabaeidae).

**ACKNOWLEDGEMENTS.** The authors are thankful to many colleagues from different countries, in first turn to M.V.L. Barclay (BMNH), N. Berti (MNH), M. Brendell (BMNH), T. Deuve (MNH), P. Hammond (BMNH), F. Hieke (ZMB), M. Jäch (NMW), H. Schönmann (NMW), M. Uhlig (ZMB). The study of the first author was also supported by the Programme of the Presidium of the Russian Academy of Sciences "Origin and Evolution of Biosphere". The study of A.G. Kirejtshuk and A.S. Kurochkin was partly supported by the grant of Russian Foundation of Basic Research (№ 07-04-00540) The third author was supported by the National Council of Science and Technology (CNPq), Brazil and is also indebted to the biologist Rogerio Deodoro da Fonseca for helping in the field and laboratory works. IBAMA (Brazilian Institute of Environment and Sustainable Development) gave us the license to research in the "Parque Nacional da Restinga de Jurubatiba".

## References

Calvente A. M., Freitas M.F. & Andreato R.H.P. 2005. Listagem, distribuição geográfica e conservação das espécies de Cactaceae no Estado do Rio de Janeiro // *Rodriguesia*, Vol.56. No.87. P.141-162.  
Connell W.A. 1957. Nitidulidae of Delaware // University of Delaware, Agricultural Experiment Station, Newark, Delaware. Bull. No.318. (Technical) (1956). 67 pp.

Dobson R.M. 1972. A new species of *Carpophilus* Stephens (Coleoptera: Nitidulidae) from Florida, USA, and reappraisal of the type material of *Carpophilus ophthalmicus* Murray // *Journal of Entomology*. (B). Vol.41. No.2. P.145-150.  
Erichson W.F. 1843. Versuch einer systematischen Einteilung der Nitidularien // *German Zeitschrift für die Entomologie*. Bd.4. S.225-261.  
Erichson W.F. 1847. Conspectus Insectorum Coleopterorum, quae in Republica Peruana observata sunt // *Archiv für Naturgeschichte*. Bd.13. S.67-185.  
Grouvelle A. 1900. Contribution à l'étude de la faune entomologique de Sumatra (Côte ouest Indapoera " Vice résidence de Painan), Nitidulidae, Colydiidae, Rhysodidae, Cucujoidea, Monotomidae, Cryptophagidae, Tritomidae (Voyage de M. Weyers) // *Annales de la Société Entomologique de Belgique*. Vol.44. P.262-268.  
Grouvelle A. 1902. Liste des Coléoptères de la Guadeloupe // *Annales de la Société Entomologique de France*. Vol.71. P.756-769.  
Grouvelle A. 1913. Byturidae, Nitidulidae // W. Junk (ed.) *Coleopterorum Catalogus*. Berlin. Vol.15. Pars 56. 223 S.  
Hayashi N. 1978. A contribution to the knowledge of the larvae of Nitidulidae occurring in Japan (Coleoptera: Cucujoidea). *Insecta Matsumurana* // *Journal of the Faculty of Agriculture Hokkaido University*. Ser. Entomology. Sapporo, Japan. New Series. Vol.14. 97 pp, 29 pls.  
Kirejtshuk A.G. 1986 a. Analysis of structure of genitalia for reconstruction of phylogeny and substantiation of system of fam. Nitidulidae (Coleoptera) // *Trudy Vsesoyuznogo Entomologicheskogo obchestva* (Proceedings of the All-Union Entomological Society). T.68. P.22-28 (in Russian).  
Kirejtshuk A.G. 1986 b. On polyphyly of the Carpophilinae with description of a new subfamily, Cillaeinae (Coleoptera, Nitidulidae) // *Coleopterist's Bulletin*. Vol.40. No.3. P.217-221.  
Kirejtshuk A.G. 1997. On the evolution of anthophilous Nitidulidae (Coleoptera) in tropical and subtropical regions // *Bonner zoologische Beiträge*. Bd.47. Ht.1-2. P.111-134.  
Kirejtshuk A.G. 1998. Nitidulidae (Coleoptera) of the Himalayas and Northern Indochina. Part 1: subfamily Epuraeinae. Koenigstein, Koeltz Scientific Books (Theses Zoologicae. Vol.28). 489 pp.  
Monteiro R.F. & Becker V.O. 2002. A new *Sigelgaita* Heinrich (Lepidoptera, Pyralidae, Phycitinae) feeding on cacti in Brazil // *Revista Brasileira de Zoologia*. Vol.19 (Supl.). P.299-304.  
Murray A. 1864. Monograph of the Family Nitidulariae // *Transactions of the Linnean Society of London*. Vol.24. P.211-414.  
Reitter E. 1873. Systematische Eintheilung der Nitidularien // *Verhandlungen des naturforschenden Vereines in Brünn*. Bd.12. Ht.1. S.5-194.  
Reitter E. 1876. Neue Nitidularier der Dohrn'schen Sammlung // *Deutsche Entomologische Zeitschrift*. Bd.20. Ht.2. S.308-309.  
Rosa C.A. 1994. Yeast communities of the cactus *Pilosocereus arrabidae* and associated insects in the sandy coastal plains of southeastern Brazil // *Antonie van Leeuwenhoek*. Vol.65. Num.1. P.55-62.  
Lawrence J.F. 1991. Coleoptera, Nitidulidae (Cucujoidea) (including Brachypteridae, Cateretidae, Cybocephalidae, Smicripidae) // *In: Stehr F.W.: Immature Insects*. Kendall-Hunt Publ. Comp., Dubuque, Iowa. Vol.2. XVI. P.456-460.  
Sharp D. 1899. Fam. Nitidulidae. *In: Biologia Centrali-Americana*. Insecta. Coleoptera. Vol.II. Pt.1. P.265-388.