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Four new species of *Notosacantha* CHEVROLAT from Borneo (Coleoptera: Chrysomelidae: Cassidinae)

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ABSTRACT. *Notosacantha diabolica*, *kinabaluensis*, *sandakanensis*, and *sarawaiensis*, all from Borneo, are described and illustrated.

Key words: entomology, taxonomy, new species, *Coleoptera*, *Chrysomelidae*, *Cassidinae*, *Notosacantha*, Borneo.

The genus *Notosacantha* CHEVROLAT with c. 240 described species is one of the most speciose genera within *Cassidinae*. Most are endemics of Madagascar and the Philippines, only 29 species were recorded from insular part of Oriental Region except the Philippines (SPAETH 1933, BOROWIEC 1999, BOROWIEC and ŚWIĘTOJAŃSKA 1999, ŚWIĘTOJAŃSKA and BOROWIEC 1999, ŚWIĘTOJAŃSKA 2001). In the material studied recently I found four new species from Borneo (both Indonesian and Malaysian part). Their descriptions are given below.

Notosacantha sarawaiensis n. sp.

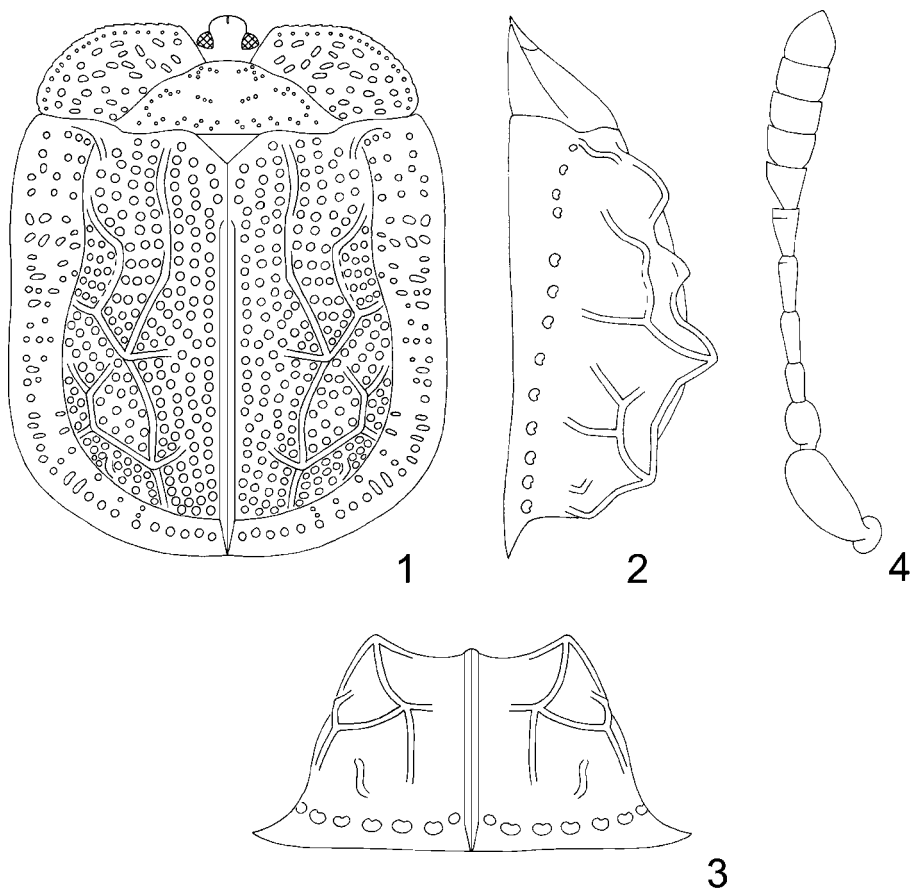
(figs 1-4, 17, 18)

ETYMOLOGY

Named after its locus typicus, Sarawai on Borneo.

DIAGNOSIS

It belongs to a group of species bearing the following characters: body short-oval to circular, complete set of costae, principal tubercle with at least three costae, dorsal costa complete, basal tubercle without connection to humeral costa, apicolateral costa complete, principal tubercle not tuberculiform, anterior and posterior branch of dorsal costa in the same point, furca interna short, not connected with lateral branch of principal tubercle, humeral costa in anterior half curved outwards, costa ultima forms short elevation, not connected with apicolateral costa. The group comprises also *N. sumatrana* (Sp.), *N. curta* (Sp.), *N. jacobsoni* (Sp.), and *N. komijai* DABR. & BOR. In dorsal coloration *N. sarawaiensis* is the most similar to *N. sumatrana*, but *N. sarawaiensis* differs in almost rectangular shape of body, with maximum width behind middle (in *N. sumatrana* body short-oval, with maximum width in the middle) and presence of furca externa (in



1-4. *Notosacantha sarawaiensis*: 1 - dorsal view, 2 - lateral view, 3 - hind view, 4 - antenna

N. sumatrana furca externa absent). Similar, rectangular body shape of body is found in *N. curta*, also from Borneo, but it differs in pronotum and anterior part of elytral disc being pale red, only part behind apicolateral costa black, explanate margin of elytra in anterior part red, in posterior part almost black, with pale spot in the middle and pale extreme margin (in *N. sarawaiensis* almost whole dorsum black), in basal, posthumeral and apical tubercles isolated (in *N. sarawaiensis* connected by costae), and apicolateral costa with almost reduced branches (in *N. sarawaiensis* apicolateral costa complete, with distinct branches). *N. curta* is distinctly smaller, with length c. 4 mm (5.6 mm in *N. sarawaiensis*). *N. jacobsoni* and *N. komiyai* differ in mostly pale dorsum, at most with black tubercles and costae; both have broadly oval or subtrapezoidal body, with maximum width at or before middle.

DESCRIPTION

Length: 5.6 mm, width: 4.7 mm, length of pronotum 1.3 mm, width of pronotum: 4.0 mm, length/width ratio: 1.19, width/length ratio of pronotum: 3.07. Body almost rectangular, slightly widened posterad (figs 1, 17).

Head, except frontal plate, disc of pronotum and disc of elytra black. Frontal plate yellowish-brown. Scutellum yellowish-brown surrounded by black. Explanate margin of pronotum mostly black, except yellowish-brown extreme margin and areas close to anterior corners. Explanate margin of elytra yellowish-brown with black, broad humeral and very broad posterolateral spots not extending to extreme margin. Yellow "window" in middle small, but extending to extreme margin of elytra. Ventrites and legs dark yellow, antennae yellowish-brown.

Head with moderately large frontal plate, broader than in related *N. curta* and *N. sumatrana*, anterior margin broadly rounded with shallow apical cleft.

Pronotum broad, with maximum width close to base, sides regularly rounded. Disc with double, impressed, irregular row of punctures along base, oblique, impressed row of punctures slightly behind the middle, and rows along anterior border and along sides, and group of punctures on sides close to anterior border. Explanate margin with quite large, mostly elongate pores, disposed regularly. Anterior half of pronotal margin finely serrate, posterior half crenulate.

Base of elytra as wide as base of pronotum. Elytral disc with complete set of costae, and complete set of tubercles: basal, subbasal, principal, apical, postapical and posthumeral (figs 1-3). Principal tubercle distinctly higher than remainder, at base slightly wider than height, with sharp top and four costae. Basal and apical tubercles almost equal in height, distinctly lower than principal tubercle but slightly higher than subbasal and postapical tubercles. Dorsal costa complete, anterior branch runs straight from base to subbasal tubercle, when distinctly curved outwards, anterior and posterior branch of dorsal costa at the top of principal tubercle converging in the same point. Posterior branch of dorsal costa from principal tubercle to apical tubercle runs obliquely to suture, from apical tubercle to posterior part of disc runs straight. Sutural branch of principal tubercle runs perpendicularly to second row of punctures. Lateral branch of principal

tubercle complete, runs obliquely anterad, extending to submarginal row of punctures. Apicosutural costa runs slightly obliquely anterad, extending to second row of punctures. Apicolateral costa complete, bifurcate apically, with distinct furca interna and furca externa, and distinct costa terminalis. Costa ultima reduced to short elevation not connected with apicolateral costa. Furca interna short, not connected with lateral branch of principal tubercle. Humeral costa distinct, especially its anterior half, distinctly curved outwards anterad, ends below humeral callus; posterior half of humeral costa less marked than its anterior half but visible on whole length. No transverse branch between anterior branch of dorsal and humeral costae. Punctuation between costae coarse, distance between punctures as wide as puncture diameter. Punctuation of explanate margin as coarse as on disc, mostly elongate, especially in posterolateral part of margin, where form shallow radial groves, no impunctate „window”. Extreme margin of explanate margin in anterior 2/3 length slightly serrate.

Antennae stout, with distinct 5-segmented club. Pedicle c. 1.7 times longer than club. Second antennal segment elongate, c. 1.4 times as long as wide, segment 7 slightly slimmer than remainder segments of club, as wide as long, segments 8, 9, and 10 distinctly wider than long (fig. 4).

Clypeus in apical half deeply impressed, the impression along middle with long and sharp carina.

TYPE MATERIAL

Holotype: “INDONESIA, W. Kalimantan, Sarawai, Tontang dist., 24-30 VII 1993” (preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland).

Notosacantha sandakanensis n. sp.

(figs 5-8, 19, 20)

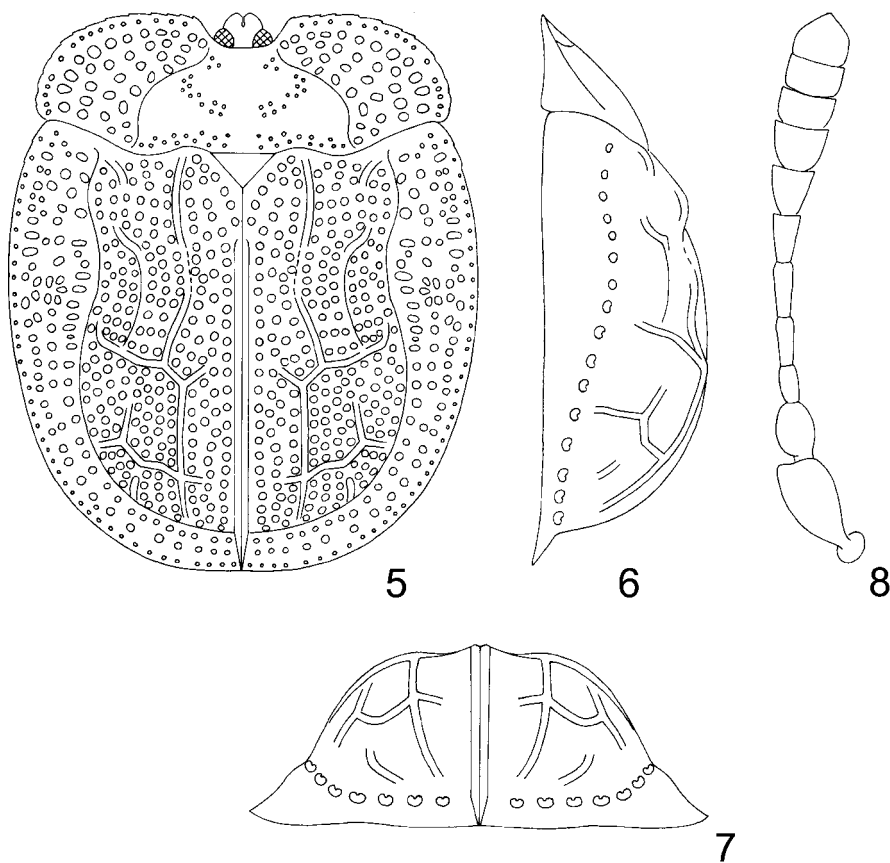
ETYMOLOGY

Named after its locus typicus, Sandakan on Borneo.

DIAGNOSIS

It belongs to a group of species bearing the following characters: body short-oval to circular, complete set of costae, principal tubercle with at least three costae, dorsal costa distinct, basal tubercle without connection to humeral costa, apicolateral costa complete, principal tubercle not tuberculiform, anterior and posterior branch of dorsal costa in principal point converging in different points, and explanate margin of elytra without humeral and posterolateral spots. The group comprises also *N. singaporica* (Sp.), *N. ginpinensis* CHEN & ZIA., *N. siamensis* (Sp.) and *N. sabahensis* BOR. & ŚWIĘT. *N. sandakanensis* is similar to *N. singaporica* and *N. sabahensis* in its interrupted dorsal costa between basal and subbasal points, isolated costa ultima and hardly marked humeral costa behind

humeral point, but differs in coloration, with elytral disc surrounded by black, while in *N. singaporica* whole disc is black and in *N. sabahensis* whole disc is reddish-brown. *N. singaporica* is also similar in hardly marked tubercles but differs in complete furca interna, extending to lateral branch of principal tubercle (shortened in *N. kinabaluensis*). *N. sabahensis*, except body coloration, differs also in the presence of well marked tubercles. *N. ginpinensis* differs in black pronotal and elytral discs, and the presence of complete costa ultima connected with apicolateral costa; it has distinctly marked elytral tubercles. *N. siamensis* differs in parallelsided body shape (short-oval in *N. kinabaluensis*), simple apicolateral costa without costae and furci (in *N. kinabaluensis* apicolateral costa possesses both furca interna and costa terminalis, also costa ultima is present), and broad truncate frontal plate (in *N. kinabaluensis* frontal plate is broadly rounded apically).



5-8. *Notosacantha sandakanensis*: 5 - dorsal view, 6 - lateral view, 7 - hind view, 8 - antenna

DESCRIPTION

Length: 5.0 mm, width: 4.1 mm, length of pronotum: 1.2 mm, width of pronotum: 3.6 mm, length/width ratio: 1.22, width/length ratio of pronotum: 3.0. Body short-oval (figs 5, 19).

Head, except pale yellow frontal plate, yellowish-red. Explanate margin of pronotum and explanate margin of elytra yellow. Disc of pronotum in basal part brownish black, on sides and in anterior part yellowish-red, border between dark and pale parts of disc indistinct. Scutellum yellowish-red. Elytral disc yellowish-red, broadly surrounded by black band, in anterior part of disc extending to humeral costa, in posterior part of disc up to dorsal costa, also basal tubercle black; on slope the band slightly paler than on sides of disc, brownish-black. Marginal interval yellowish red, only in area below humeral callus the dark band extending up to marginal row. Ventrites, legs and antennae yellow.

Head with moderately large frontal plate, broadly rounded apically, with shallow apical cleft.

Pronotum broad, with maximum width close to base, sides regularly rounded. Disc with double irregular row of punctures along base, group of punctures slightly behind the middle, and few punctures along anterior border. Explanate margin with large, mostly rounded pores, disposed regularly. Anterior half of pronotal margin serrate, posterior half crenulate.

Base of elytra narrower than base of pronotum. Elytral disc with complete set of costae but without distinct tubercles (figs 5-7). Dorsal costa complete, anterior branch in the middle slightly curved to suture, interrupted between basal and subbasal point. Anterior and posterior branch of dorsal costa at the top of principal point converging in different points. Posterior branch of dorsal costa runs straight. Sutural branch of principal point runs obliquely anterad, extending to second row of punctures. Lateral branch of principal point complete, runs obliquely anterad, extending to submarginal row of punctures. Short apicosutural costa extending to second row of punctures. Apicolateral costa complete, bifurcate apically, with equal in length furca interna and costa terminalis. Costa ultima reduced to short elevation, not connected with apicolateral costa. Furca interna not connected with lateral branch of principal point. Humeral costa distinctly elevated in anterior third, but hardly marked in posterior part. Anterior part of humeral costa distinctly bent outwards, ends below humeral callus. No transverse costa between anterior branches of dorsal and humeral costae. Punctuation between costae coarse, distance between punctures as wide as puncture diameter. Punctuation of explanate margin as coarse as on disc or slightly finer, mostly rounded, disposed more or less regularly, no impunctate „window”. Extreme margin of explanate margin in anterior half slightly serrate (but not in posterior part).

Antennae stout, with distinct 5-segmented club. Pedicle c. 1.7 times longer than club. Second antennal segment elongate, c. 1.5 times as long as wide, segment 7 slightly longer than width, distinctly slimmer than remainder segments of club, segments 8-10 distinctly wider than long (fig. 8).

Clypeus in apical half shallowly impressed, the impression along middle with long and sharp carina.

TYPE MATERIAL

Holotype: "MALAYSIA, Borneo, Sabah, Sandakan" (preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland).

Notosacantha diabolica n. sp.

(figs 9-12, 21, 22)

ETYMOLOGY

Named after its mostly black pronotum and elytra.

DIAGNOSIS

It belongs to a group of species bearing the following characters: body short-oval to circular, elytral costae complete, principal tubercle with at least three costae, dorsal costa complete, basal tubercle without connection to humeral costa, apicolateral costa complete, principal tubercle not tuberculiform, anterior and posterior branch of dorsal costa in principal point converging in the same point, furca interna connected with lateral branch of principal tubercle, principal tubercle prominent but not higher than its basal width, sides of pronotum broadly rounded. The group comprises also *N. appropinquans* (Sp.), *N. calligera* (Sp.) and *N. corporaali* (Sp.). *N. appropinquans* and *N. corporaali* differ from *N. diabolica* in almost parallelsided body shape (in *N. diabolica* sides of elytra distinctly converging posterad, body subtrapezoidal). *N. appropinquans* also differs in coloration, with dorsum mostly yellowish-red and only tubercles and costae infusate (dorsum of *N. diabolica* mostly black). *N. corporaali* is similar in mostly black dorsal part of body, but in *N. corporaali* yellow "window" on elytral explanate margin is wider than in *N. diabolica*, extending to extreme margin of elytra, and elytral disc is not uniformly black, with some paler, brownish-yellow areas. Costa ultima in *N. corporaali* forms isolated fold while in *N. diabolica* it is complete, connected with apicolateral costa. *N. calligera* differs in almost square body outline, paler coloured dorsum, mostly brown, and larger impunctate "window" on explanate margin of elytra, extending almost to extreme margin of elytra.

DESCRIPTION

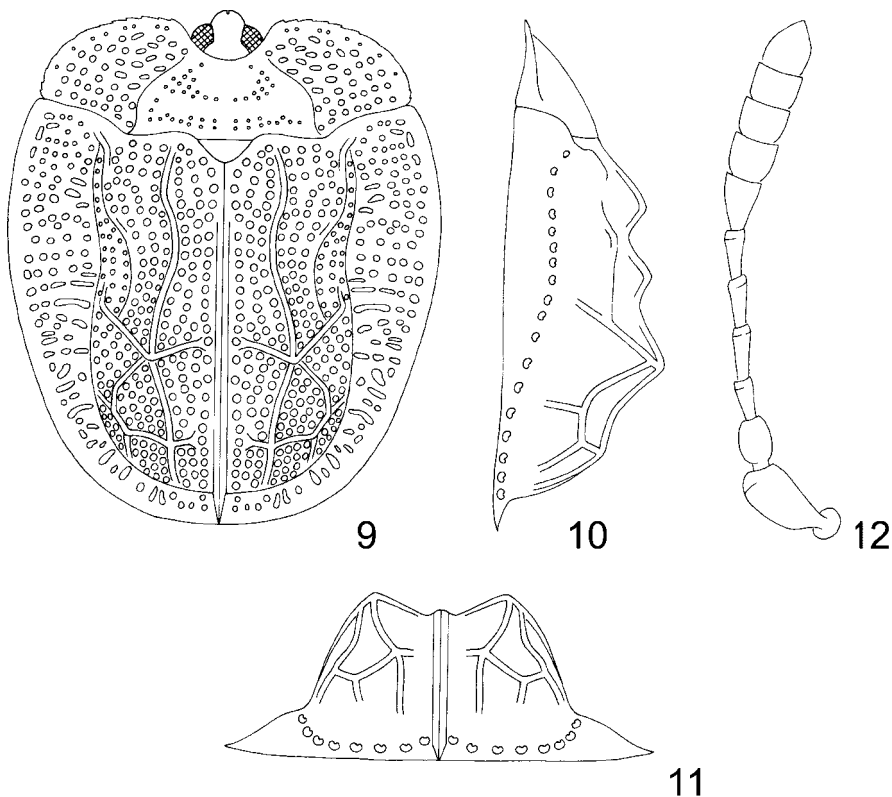
Length: 6.0-6.4 mm, width: 4.9-5.5 mm, length of pronotum: 1.5 mm, width of pronotum: 4.1-4.3 mm, length/width ratio: 1.16-1.22, width/length ratio of pronotum: 2.73-2.86. Body short-oval, the widest in 2/5 body length, then converging posterad (figs 9, 21).

Head, except yellow to dark yellow frontal plate, yellowish-brown to black. Disc of pronotum black, or with indistinct brighter, brownish areas. Explanate

margin of pronotum mostly brownish-black with large yellow spot close to pronotal emargination, and smaller spot close to basal border of disc and explanate margin, also extreme margin of pronotum narrowly yellowish. Scutellum brown to dark brown, sometimes with paler apex. Disc of elytra black. Explanate margin of elytra black, except small, closed yellow "window" in 1/3 length of the margin, and yellow to yellowish-brown extreme margin, also anterior margin of the explanate margin below humeral callus narrowly yellow. Ventrites, legs and antennae to yellowish-brown.

Head with moderately large frontal plate, converging in triangle with shallow apical cleft.

Pronotum broad with maximum width at base, sides regularly rounded. Disc with double row of punctures along base, oblique row slightly behind the middle, row along anterior border and along sides, and group of punctures on sides close to anterior border. Explanate margin with large pores, disposed regularly. Pores in area close to disc slightly elongate. Anterior half of pronotal margin serrate, posterior half crenulate.



9-12. *Notosacantha diabolica*: 9 - dorsal view, 10 - lateral view, 11 - hind view, 12 - antenna

Base of elytra not or slightly wider than base of pronotum. Elytral disc with complete set of costae, and complete set of tubercles: prominent basal, subbasal, principal, and low apical, and the lowest posthumeral (figs 9-11). Basal and subbasal tubercles equal in height, principal tubercle distinctly higher than remainder tubercles, with sharp top and four costae. Dorsal costa complete, anterior branch in posterior half and posterior branch in anterior half curved outwards. Anterior and posterior branch of dorsal costa at the top of principal tubercle converging in the same point. Sutural branch of principal tubercle extending to first row of punctures or to suture. Lateral branch of principal tubercle complete, runs obliquely anterad, extending to submarginal row of punctures. Apicosutural costa extending to first row of punctures. Apicolateral costa complete, bifurcate apically, with furca interna, costa terminalis and costa ultima. Furca interna connected with lateral branch of principal tubercle slightly outwards of the top of principal tubercle (in one of paratypes end of furca interna slightly vanishing between large punctures of principal tubercle). Costa ultima connected with apicolateral costa. Humeral costa distinct, its anterior half distinctly curved outwards and connected with costa of humeral callus. No transverse costa between anterior branch of dorsal and humeral costa. Punctuation between costae coarse, distance between punctures as wide as puncture diameter. Punctuation of explanate margin as coarse as on disc, punctures along border of disc elongate with tendency to group in more or less distinct radial grooves, no impunctate „window”.

Antennae slim, with distinct 5-segmented club. Pedicle c. 1.5 times longer than club. Second antennal segment elongate, c. 1.5 times longer than wide, segment 7 distinctly longer than wide, segment 8 as wide as long, segments 9 and 10 slightly wider than long (fig. 12).

Clypeus in apical half deeply impressed, the impression without carina.

TYPE MATERIAL

Holotype: “MALAYSIA, Borneo, Sabah, Poring – Hot Springs, 600 m, 10 VIII 1999” (preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland); paratype: the same data; paratype: “MALAYSIA, Borneo, Sabah, Kinabalu N. P., Sayap, 1000 m, 30 XI 1998” (all preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland).

Notosacantha kinabaluensis n. sp.

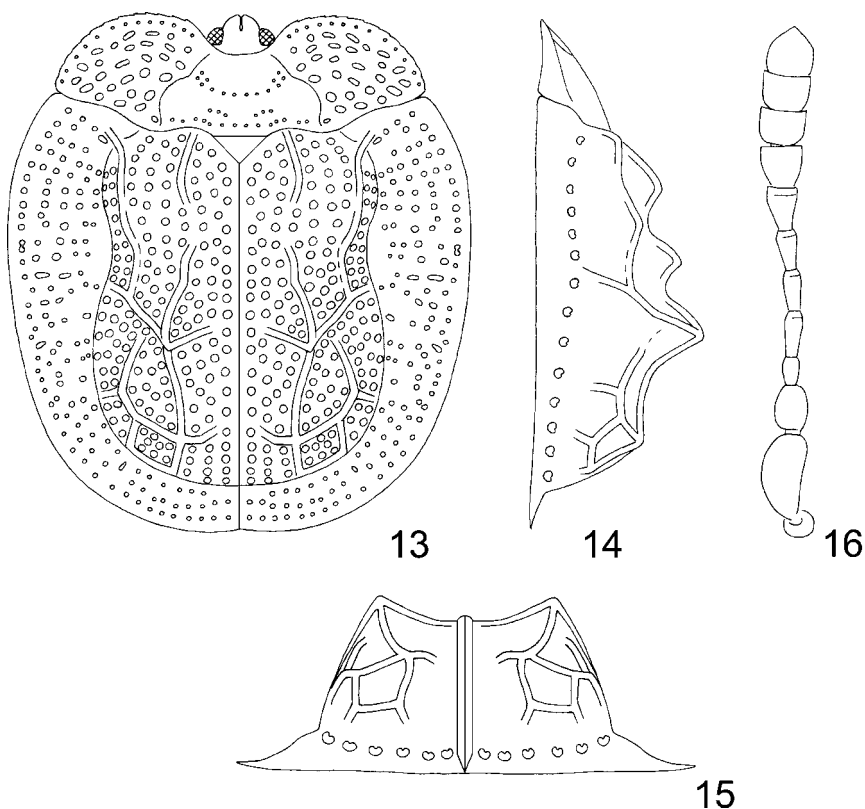
(figs 13-16, 23, 24)

ETYMOLOGY

Named after its locus typicus, Mt. Kinabalu on Borneo.

DIAGNOSIS

It belongs to a group of species bearing the following characters: body short-oval to circular, complete set of costae, principal tubercle with at least three costae, dorsal costa complete, basal tubercle without connection to humeral costa, apicolateral costa complete, principal tubercle not tuberculiform, anterior and posterior branch of dorsal costa in principal tubercle converging in the same point, furca interna not connected with lateral branch of principal tubercle, humeral costa in anterior half curved outwards, costa ultima distinct, connected with apicolateral costa, explanate margin of elytra usually not uniformly coloured, dorsal part of body mostly black with yellow window on explanate margin of elytra. The group comprises also *N. corporaali* (Sp.) and *N. bioculata* (Wag.). *Notosacantha kinabaluensis* is a unique species, well distinguished from all its relatives by the presence of postapical costa; it is the only Oriental species with complete postapical costa, the character occurs only in a few species from Madagascar, but they belong to completely different species groups, not related to Oriental taxa.



13-16. *Notosacantha kinabaluensis*: 13 - dorsal view, 14 - lateral view, 15 - hind view, 16 - antenna

DESCRIPTION

Length: 6.0 mm, width: 5.1 mm, length of pronotum: 1.5 mm, width of pronotum: 4.1 mm, length/width ratio: 1.17, width/length ratio of pronotum: 2.73. Body short-oval (figs 13, 23).

Head, except yellowish-brown frontal plate, brownish-black. Disc of pronotum mostly yellowish-brown with brownish-black spots along sides connected by V-shaped band placed across middle of disc. Explanate margin of pronotum mostly black, with yellow: area close to median emargination of pronotum, along border of disc, at base close to disc, also anterior margin of pronotum narrowly yellowish. Scutellum yellowish-brown. Disc of elytra in 1/4 basal length yellowish-brown with black punctures and black bases of costae, and brownish black spot behind humeral callus, posterior 3/4 length of disc black. Explanate margin of elytra black, except small yellow, closed "window" in 1/3 length of the margin, and yellow to yellowish-brown extreme margin and small spots below humeral callus. Ventrites, legs, and antennae yellowish.

Head with moderately large frontal plate, converging in triangle, with shallow apical cleft.

Pronotum broad, with maximum width at base, sides regularly rounded. Disc with row of punctures along base, oblique row in the middle and few punctures close to anterior border. Explanate margin with large pores, mostly elongate, disposed regularly. Anterior half of pronotal margin serrate, posterior half finely crenulate.

Base of elytra as wide as base of pronotum, sides regularly rounded. Elytral disc with complete set of costae, and complete set of tubercles: basal, subbasal, principal, apical, humeral, posthumeral, and with marked postapical point (figs 13-15). Principal tubercle distinctly higher than in related species, c. as wide as high with sharp top and four costae. Dorsal costa complete, only anterior branch shortly broken between basal and subbasal tubercle. Anterior and posterior branch of dorsal costa at the top of principal tubercle converging in the same point. Posterior half of anterior branch and anterior half of posterior branch curved outwards, posterior branch in the middle slightly curved to suture. Sutural branch of principal tubercle extending to first row of punctures. Lateral branch of principal tubercle complete, runs obliquely anterad, extending to submarginal row of punctures. Apicosutural costa extending to first row of punctures. Apicolateral costa complete, bifurcate apically, with furca interna, costa terminalis and costa ultima. Furca interna long, but not connected with lateral branch of principal tubercle. Costa ultima connected with posterolateral costa of postapical point. Anterior half of humeral costa distinctly curved outwards and connected with costa on humeral callus, posterior 1/3 length of humeral costa less marked than its anterior 2/3 length. No transverse costa between anterior branch of dorsal and humeral costa. Punctuation between costae coarse, distance between punctures as wide as puncture diameter or slightly wider. Punctuation of explanate margin mostly finer than on disc, only few punctures as coarse as on disc, with tendency to group in radial grooves, yellow „window" mostly impunctate.

Antennae stout, with distinct 5-segmented club. Pedicle c. 1.4 times longer than club. Second antennal segment elongate, c. 1.4 times longer than wide, segment 7 distinctly slimmer than remainder segments of club, segment 8 as wide as long, segments 9 and 10 wider than long (fig. 16). Clypeus in apical half deeply impressed, the impression only in anterior part with short carina.

TYPE MATERIAL

Holotype: "MALAYSIA, Borneo, Sabah, Kinabalu N. P., Sayap, 1000 m, 30 XI 1998" (preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland).

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17, 18. *Notosacantha sarawaiensis*; 19, 20. *N. sandakanensis*; 21, 22. *N. diabolica*; 23, 24. *N. kinabaluensis*: 17, 19, 21, 23 – dorsal, 18, 20, 22, 24 – lateral

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