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Taxonomy, biology and host plant of the Australian leaf beetle *Stethomela submetallica* Baly (Coleoptera: Chrysomelidae) from the wet forests of north-eastern New South Wales, Australia, with descriptions of the egg, larva and adult

With 1 figure

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Abstract: The leaf beetle *Stethomela submetallica* Baly is described from larval and adult material collected by the first author from subtropical rainforest / wet sclerophyll forest in north-eastern New South Wales, Australia. The egg is also described. Adults and larvae feed on the young, fresh leaves of the small rainforest tree, *Guilfoylia monostylis* (Benth.) F. Muell. (Surianaceae). This plant has not been recorded previously as a host plant for any Australian chrysomelid beetle, no other Coleoptera are presently known from this plant and the family Surianaceae has not been recorded previously as a host family for the Chrysomelidae, either in Australia or elsewhere in the world. The larval morphology of *S. submetallica* indicates that the genus *Stethomela* should be placed in the subtribe Chrysolinina Chen 1936 of the tribe Chrysomelini Reitter (subfamily Chrysomelinae).

Zusammenfassung: Der Blattkäfer *Stethomela submetallica* Baly wird anhand von Larven und Adulten beschrieben, die vom erstgenannten Autor im subtropischen Regenwald / feuchten Hartlaubwald des nordöstlichen Neusüdwales, Australien, gesammelt wurden. Das Ei wird ebenfalls beschrieben. Adulte und Larven fressen junge Blätter des kleinen Regenwaldbaumes *Guilfoylia monostylis* (Benth.) F. Muell. (Surianaceae). Diese Pflanze wurde bisher noch nicht als Wirtspflanze irgend eines australischen Chrysomeliden festgestellt. Auch keine anderen Käfer dieser Pflanze sind gegenwärtig bekannt. Die Pflanzenfamilie Surianaceae wurde bisher noch nicht als Wirtsfamilie der Chrysomeliden verzeichnet, weder in Australien, noch anderswo in der Welt. Die Morphologie der Larve von *S. submetallica* zeigt, daß die Gattung *Stethomela* zum Subtribus Chrysolinina Chen 1936 des Tribus Chrysomelini Reitter (Unterfamilie Chrysomelinae) gestellt werden sollte.

Introduction

The genus *Stethomela* Baly, 1856 (Coleoptera: Chrysomelidae: Chrysomelinae) is mainly confined to eastern Australia and the Northern Territory, where at least 10 species have been recognised (BALY 1856, LEA 1916). Most of the species are apparently restricted to the rainforests (wet forests) of north-eastern Queensland, e.g. *S. submetallica* Baly, *S. olivacea* Jacoby, *S. purpureipennis* Lea and *S. flavomarginata* Lea (LEA 1916). Most of the species in the genus are quite distinctive and are readily identified by using a combination of colour, size and external morphological features.

During 1994, larvae of an unidentified chrysomelid species were collected by the senior author from the young, developing leaves on a lower branch of a small tree (5–6 m high) of *Guilfoylia monostylis* (Benth.) F. Muell. (Surianaceae), growing in rainforest / wet sclerophyll forest interface in the Nimbin area, north-eastern New South Wales. Further mature larvae and a few associated adults have been obtained since then during February–March 1996. Comparison of this adult material with the type description and named museum specimens have confirmed TJH's material as *S. submetallica* Baly. On the basis of this material, the species (both adult and larva) are described below, the larva (and egg) for the first time.

Descriptions of life-stages of *S. submetallica*

Stethomela submetallica Baly, 1856: 252.

Adult: Robust, strongly convex, longer than broad, 9.0–9.5 mm long × 5.8–6.4 mm wide (males), 10.0–11.0 mm long × 6.8–7.5 mm wide (females). Head about 2.0 times wider than long, orange to pale orange-brown (becoming reddish-brown, dark orange-brown or piceous after death), deeply impressed with a longitudinal sulcus behind the posterior margin of the eyes; fronto-clypeus and vertex sparsely punctate, punctures small and shallow; fronto-clypeus with a shallow but well-defined inverted T-shaped impression and with several small, shallow punctures surrounding it; mandibles black. Pronotum orange (becoming red to reddish-brown, dark orange-brown or piceous after death), narrowly margined, twice as wide as long, lateral margins more or less parallel, narrowed and rounded at base (anterior margin); anterior margin slightly bisinuate (?). Antennae: 1st segment broad, more convex on one side, about 2.0 times longer than wide; 2nd segment short, about 2.2 times longer than wide, slightly wider distally; 3rd segment 3.5 times wider than long, about the same width as segment 2, slightly wider distally; 4th segment similar to the 3rd, but slightly shorter; 5th segment similar to the 4th but slightly narrower; 6th segment similar to the 5th segment but slightly wider; 7–10th segments about 2.5 times wider than long, wider than the 6th segment; 11th segment about 2.6–2.8 times longer than wide, longer than segments 7–10 and with a broadly triangular-shaped apex; segments 1–3 yellow-brown, segments 4 darker yellow-brown, segments 5–11 black; segments with two types of setae: small setae on most surfaces; longer setae at the distal apex and also scattered elsewhere; segments 4–11 more setose than segments 1–3; segments 6–10 flattened. Pronotum, broad, about 2.2 times wider than long, orange to pale orange-brown, becoming dark orange to dark brown or piceous after death; antero-lateral marginal area with a concentration of large, irregularly-spaced punctures covering an area

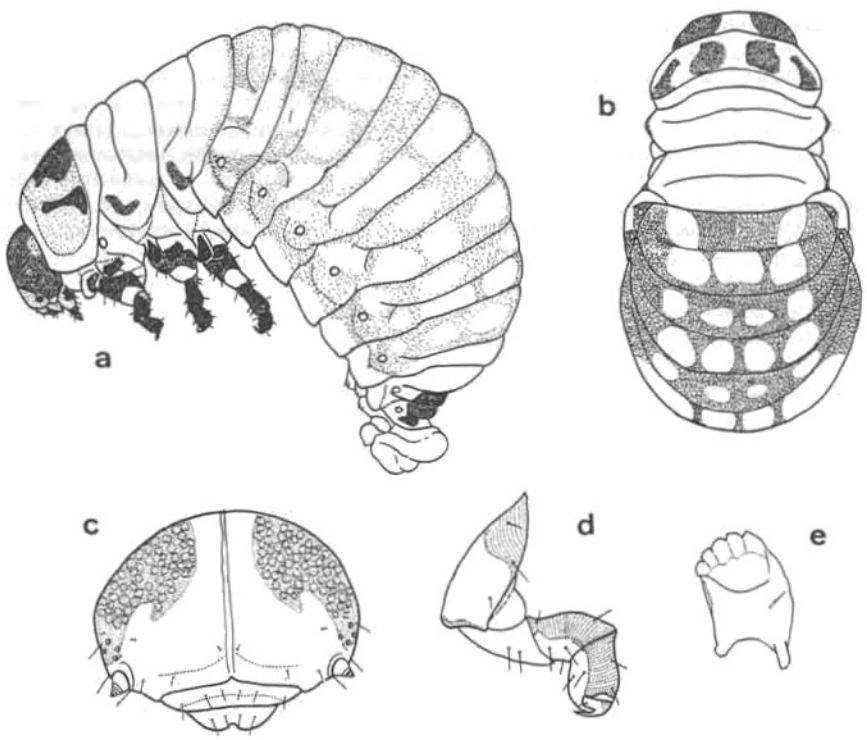

Fig. 1. *Stethomela submetallica* Baly: last instar larva. (a) lateral view; (b) dorsal view; (c) head, front view; (d) proleg; (e) mandible showing blunt teeth. (Illustrations: H. Takizawa).

of dark metallic greenish-blue (in both sexes), punctures smaller, shallower and more sparsely distributed, almost impunctate in the central region of the disc, more concentrated along anterior margin, and less so on the posterior margin. Prosternum abruptly truncate anteriorly, apical region broad and flat. Scutellum narrow, triangular, impunctate, orange to orange-brown. Elytra glabrous, bright shining metallic blue (in males) to metallic greenish-blue (in females) (elytral colour often dulling after death), broader than the pronotum, each elytron about 2.5–2.6 times longer than wide; disc finely punctate-striate, punctures irregularly spaced on striae. Underside of body and legs pale buff-brown to pale orange-brown, sparsely punctate.

Last instar larva: Comparatively large and rotund, 12 mm in length, 6 mm in width [in preserved (alcohol) specimens], strongly convex dorsally and widest at the 4–5th abdominal segments; yellowish-white [dark pink in life] with legs and spiracles black; head with a pair of large blackish patches on vertex; pronotum dorsally with 2 pairs of black patches; abdomen densely covered with chitinous platelets leaving obscure round patches; tubercles generally undeveloped, except for small crescent Dle (?) on meso-/metathorax and 7th–8th abdominal segments; dorsum almost glabrous; 6th–8th abdominal segments each with a pair of small pseudopod-like processes ventrally; legs stout, with long setae; claws deeply incised near base. Head transverse with a few setae anteriorly and laterally; frontal sutures indistinct; endo-carina weakly developed; surface shining and covered with obscure small, rounded patterns on vertex; ocelli in 6 pairs; antenna short and 3-segmented; clypeus pale on apical half and gently arched at anterior margin; labrum deeply incised at anterior margin; lower mouthparts typical of the subfamily, weakly chitinized; mandible with 5 small, blunt teeth. Abdomen ventrally with microsetae corresponding to ES, SS, PS, P and EP, without such setae dorsally; 7th abdominal segment dorsally with a large transverse tubercle on posterior half; 8th and 9th abdominal segments with a pair of transverse tubercles.

Material examined: 2 mature larvae, Blue Knob, near Nimbin, New South Wales, Australia, 17 March 1996, T. J. Hawkeswood collector, from foliage of *Guilfoylia monostylis* (Benth.) F. Muell. (Surianaceae), at interface of rainforest and wet sclerophyll forest (partially degraded habitat due to previous farming in the area). In collection of H. Takizawa.

Egg: Elongate-oblong, almost cylindrical, with rounded apices, bright orange when first laid, but turning brownish to orange-brown with age, 2.7–2.8 mm long. In captivity, one female laid 13 eggs over a period of 1.5 days before being preserved.

Description of host plant and associated plant species

Guilfoylia monostylis (Benth.) F. Muell. belongs to a monotypic genus in the Surianaceae. It is a small to medium-sized tree, often with a pendulous habit, found in the subtropical rainforests, warm temperate rainforests and dry rainforests of north-eastern New South Wales, from Wingham northwards (Williams et al. 1984). It is commonly known as Native Plum or Solo Tree (Anderson 1968). The leaves of *G. monostylis* are lanceolate, oblong-elliptic to narrow-elliptic, 6–13 cm long, 1.5–3.0 cm wide and are soft, green, smooth and finely veined on both surfaces; they are characterised by having small domatia mostly on the underside of the leaves. The bark of *G. monostylis* is characterised by the presence of numerous large lenticels. The fruit is a shiny black, globular drupe (Williams et al. 1984). Other tree species associated with *G. monostylis* at the Nimbin site include *Eucalyptus viminalis* Labill. and other *Eucalyptus* spp., *Syzygium* spp., *Rhodomyrtus* spp., *Tristania* sp. (Myrtaceae), *Acacia maidenii* F. Muell. (Mimosaceae), *Citriobatus* sp., *Pittosporum undulatum* R.Br. (Pittosporaceae), *Ficus* spp. (Moraceae), *Guoia semiglauca* (F. Muell.) Radk. (Sapindaceae) and many other rainforest tree species, usually of limited occurrence.

Biological observations

Adults and larvae are not very common, either temporally or spatially, at the site where they have been collected by the senior author; usually only one adult or one last instar (mature) larva occur at any one time on a particular preferred plant which is usually a small, non-flowering tree of *G. monostylis* 1–2 m high. Only two plants have been located with adults / larvae since they were

first detected in 1994, even though larger trees of *G. monostylis* occur in the near vicinity. On one occasion, a mating pair were obtained. Other earlier instar larvae have been observed, but these have not been collected in order to help preserve the species and reduce predation pressure. Adults and larvae prefer the underside (abaxial) surfaces of young, soft leaves, where they feed on the leaf margins. The larvae take 2–3 weeks to reach maturity. The pupal site has not been determined but may be on the ground amongst litter and bark or amongst bark on trees growing nearby.

Discussion

(a) Larva

This is the first larva described for this Australian genus of Chrysomelidae, and on the basis of larval morphology can be characterised by a combination the following characters: Body robust, strongly convex and widest on the abdomen, almost glabrous and lacking tubercles; 6^{th}–8^{th} abdominal segments with pseudopod-like processes and without defensive glands; claws strongly incised near base; head with frontal suture almost undeveloped. These characters are largely shared with larvae of *Labidomera* Chevrolat and possibly *Leptinotarsa* Stål, *Zygogramma* Chevrolat and *Calligrapha* Chevrolat (subtribe Doryphorina Yuasa). This subtribe is generally fused with the subtribe Chrysolinina Chen, which treatment is also supported by larval morphology. Thus it seems reasonable to place the genus *Stethomela* in the subtribe Chrysolinina Chen, 1936, together with *Chrysolina* Motschulsky and its related genera. Daccordi (1994) divided this subtribe into 7 groups, viz. *Barymela*-group, *Colaphellus*-group, *Phaedon*-group, *Chalcomela*-group, *Phratora*-group, *Chrysomela*-group and the *Hispostoma*-group. These groups seem inconsistent with larval groups based on morphology, especially in terms of the presence / absence of paired defensive glands laterally on the body. The *Chalcoma*-group, distributed within Australia, New Guinea and New Zealand, includes *Callidemum* Blanchard, *Promechus* Boisduval, *Calomela* Hope etc. (Daccordi 1994). Although larvae of these genera share with the larvae of *Chrysomela* in lacking defensive glands, they still form no natural group. *Promechus* was suggested to belong to the subtribe Phyllocharina on the basis of larval morphology (Reid 1991), but *Callidemum* and *Calomela* apparently belong to the subtribe Chrysolinina. As Daccordi (1994) himself stressed, traditional morphological traits may have little relevance to the phylogeny of the subfamily Chrysomelinae. Further studies on the larvae of Australian Chrysomelinae may result in some drastic changes of Daccordi's subdivisions.

(b) Adult

The adults of most of the species of *Stethomela* (sensu stricto) which the senior author has examined in Australian museums, are readly distinguished on the basis of size, colour pattern and puncturation of the pronotum and elytra. The type specimen(s) of *S. submetallica* were collected from Moreton Bay, the name which Brisbane and environs were originally called. The specimens were most likely collected in the ranges around Brisbane such as in the Mt. Glorious – Mt. Superbus area or perhaps in the Mt. Tamborine area. *S. submetallica* is closely related to *S. parvicollis* Jacoby, 1885 and *S. olivaceus* Jacoby, 1885 but is less metallic (duller) and the elytra are green and the pronotum is darker orange than in those two other species. *S. submetallica* is also a smaller species. The presence of sexual dicromatism in *S. submetallica* has not been described before. The elytra of the male is bright shining metallic blue and are metallic greenish-blue in females. The females are also slightly larger than the males, a condition which is often common in Chrysomelidae and Coleoptera in general.

(c) The host plant

The host plant *Guilfoylia monostylis* has not been listed previously as a host plant for any Australian Chrysomelidae or Coleoptera in general as far as we are aware. The species belongs to a monotypic genus of a relatively primitive flora group found only in warmer rainforests (subtropical and tropical) of north-eastern New South Wales and Queensland (Williams et al. 1984, Harden 1991). It is presently placed in the endemic Australian family Surianaceae along with two other monotypic genera (Harden 1991). This food plant relationship may be more ancient than

for other apparently closely chrysomeline genera e.g. *Calomela* which are almost host-specific on *Acacia* (Mimosaceae) and related species of *Stethomela* such as *S. disorufa* Lea and *S. fulvicollis* Jacoby on *Acacia* spp. (Mimosaceae) (BROOKS 1949, 1965).

Guilfoylia is sometimes placed in the closely related family Simaroubaceae which has about 25 genera and 150 species scattered throughout the tropical and subtropical areas of the world especially in the Americas. Only 4 genera and about 7 species are known from Australia (HEWSON 1985, HARDEN 1991). No Australian Chrysomelidae have as yet been recorded using the Simaroubaceae as host and in fact, the family has apparently not been recorded as hosts for any extra-Australian species either (JOLIVET & PETITPIERRE 1976, JOLIVET & HAWKESWOOD 1995). It would appear that based on morphology that *Guilfoylia* should be placed in the Surianaceae which has affinities with the Sapindaceae. It is interesting to note that this family is host for *Spilopyra sumptuosa* Baly which has been recorded from trees of *Guoia semiglauca* (HAWKESWOOD 1991, 1992) growing next to plants of *Guilfoylia* on the same site near Nimbin, New South Wales where *S. submetallica* has been found. It may be possible that *S. submetallica* feeds on Sapindaceae as well and this suggestion will be investigated when suitable opportunities arise.

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