NOTES ON TELEGEUSIS AND SOME RELATIVES
(Coleoptera, Lymexylidae)[1]

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Two small, slender, pale beetles having very short elytra and long sensory extensions on the labial and maxillary palpi came to our old oil lantern in Castle Creek Canyon near Hot Springs (40 miles northwest of Phoenix), Arizona, in late June, 1901, and the enigma of their significance as then explained by E. A. Schwarz was very impressive. He and H. G. Hubbard had taken another species of this genus near Tucson and at Fort Grant three years previously, and only Horn's record of the single specimen from the tip of the Lower California peninsula was then known. Later a specimen in the Horn collection in Philadelphia was mistakenly believed to be the type, but it and our samples were extremely unlike the figure published by Horn in 1895 (Proc. California Acad. Sci. vol. 5, pl. 20, fig. 1). New illustrations and notes were made, but it became clear that until more adequate samples and data were available the naming of "new species" would merely confuse the involved issues.

Horn had placed *Telegeusis* in the Drilidae, in which family it was catalogued by Olivier, 1910 (in Junk, Coleopterorum Catalogus, part 10, p. 9). My suspicion that *Telegeusis* is a very close relative of *Atractocerus* in the Lymexylidae, as stated in 1913 while considering affinities of *Micromalthus* (Proc. Ent. Soc. Washington vol. 15, p. 37), was supported by the late Fred Muir (in litt.) in time to record his finding in a footnote. Leng, 1920 (Cat. Coleop. Amer. north of Mex. pp. 31, 152), proposed the family name Telegeusidae, and later Leng and Mutchler, 1927 (Suppl. Cat. Coleop. north of Mex. p. 28), wrongly removed *Atractocerus gracilicornis* Schenkling, 1914, from Lymexylidae and placed it in Telegeusidae. Martin, 1932 (Pan-Pacific Ent., vol. 8, p. 91), gave the name *Telegeusis nubifer* to two specimens from southern Arizona, as distinct from *T. debilis* Horn; the types of both are preserved in the California Academy of Sciences. Schenkling, 1934 (in Junk,

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[1]Leng's use of Lymexylidae is correct and reappears in the catalogue by Winkler 1925, but Lymexylonidae is still used in foreign papers. Dr. Roland Brown tells me the Greek word xylon is neuter and calls for the shorter spelling under the Rules.

[2]Mr. Barber died on June 1, 1950.

Coleop. Cat., part 133), adopted Telegeusidae from Leng, including only the two species but did not refer to Olivier, 1910, nor to Barber, 1913.

Much additional material was accumulated by various collectors, but the uncertainties remained very discouraging. The present note results from the kindness of Dr. E. C. Van Dyke in placing the type specimens of both named species of *Telegeusis* before me and, after 47 years of doubt, it was a great satisfaction to learn how closely Horn's type specimen agrees with the figure he had published.

Most of the facts of life of this genus are still unknown, and until a better method for preparing such delicate forms can be applied to new samples little more than taxonomic guessing can be expected. Nearly forty males came to the lantern on June 17, 1949, in Baboquivari Cañon (50 miles southwest of Tucson) Arizona, during a short period before a windstorm, and were rapidly collected in an aspirator by Dr. Floyd G. Werner. They were killed in ethyl acetate vapor and preserved in 70% alcohol. Much of the shrinkage and collapse of their structure so objectionable in ordinary specimens was thus prevented. After they had been dehydrated in absolute alcohol, cleared in xylene, dried, and mounted, very superior specimens were available, but, if a method of distending such specimens can be applied before they are fixed in alcohol, still better samples might be obtained.

This and other series preserved by various collectors indicate the abundance of these beetles at their time of flight. But as yet no association of sexes, no breeding place, no larvae, and no biology are known. No female has been recognized, and all specimens in collections are probably males. The sex of the type of *T. debilis*, which Horn believed to be a female, could not be positively ascertained without relaxing it, but the visible terminal segments seemed identical in shape with specimens known to be males.

The following hypothesis may stimulate better investigation.

The very few and too little-known species comprising the primitive family Lymexylidae of wood borers have survived as "living fossils," but have undergone very divergent structural modification adaptive to their extremely different habitats and habits both in their adult and larval forms. The feeble soft-bodied ship-timber beetle *Lymexylon navale*, which bores in oak in northern Europe,

retains its beetle-like structure with long elytra covering transversely folding and normally veined underwings; the related genus *Atractocerus* of tropical forests, whose larva resembles that of *Lymexylon*, has reduced its elytra to vestigial appendages and has developed strong longitudinal venation without transverse folds. *Atractocerus* flies like a hawk moth, and in some species vertical and horizontal rudders have developed in the form of a large midventral lamella and lateral expansions of segments 8 and 9 of the very flexible abdomen. *Telegeusis* is a dwarfed, depressed, and simplified relative of *Atractocerus* modified to its life in the Sonoran desert region. Its breeding place is probably in the roots of desert plants. Its depressed form, small size, and pale color are necessary adaptations to this habitat and enable the males to seek out their yet unknown mates which probably remain close to the roots in which they matured. These beetles are abundant from Cape San Lucas to central Arizona.

But who will dig them out, recognize their larvae in their galleries and learn if, like so many other plant borers, different species are peculiar to different host plants? For, as is repeatedly evident in our work, species (i.e., self-perpetuating populations isolated by some vital barrier from related but similarly isolated populations) may be more distinct in their hereditary chemitropic controls than in visible structural differences. As yet, we have from such populations only relatively minute samples consisting mostly of shrunken and mummied individuals without any reliable comparative vital data.

Too little is known of the aedeagal structures of the Lymexylidae, and it is unfortunate that the latest contribution (Jeannel and Paulian, 1944, Rev. Francais d'Ent., vol. II, fasc. 2, p. 77, fig. 19) illustrates what seems to be the somewhat mutilated female structures (ovipositor) of *Atractocerus brevicornis* as if they were the genitalia of the male. Figures 46 and 47 on p. 83 of this work seem also to have been drawn from the female (ovipositor) and do not represent male structures (aedeagus) of *Ripiphorus* (which they call *Myodytes subdipterus*). Sharp and Muir, 1912 (Trans. Ent. Soc. London, p. 542, pl. 66, figs. 149, 150, 150a), had already given excellent diagrams showing aedeagi of two species of *Atractocerus*, but great modification of the median and lateral lobes is evident in the few males of other species which are available in the United

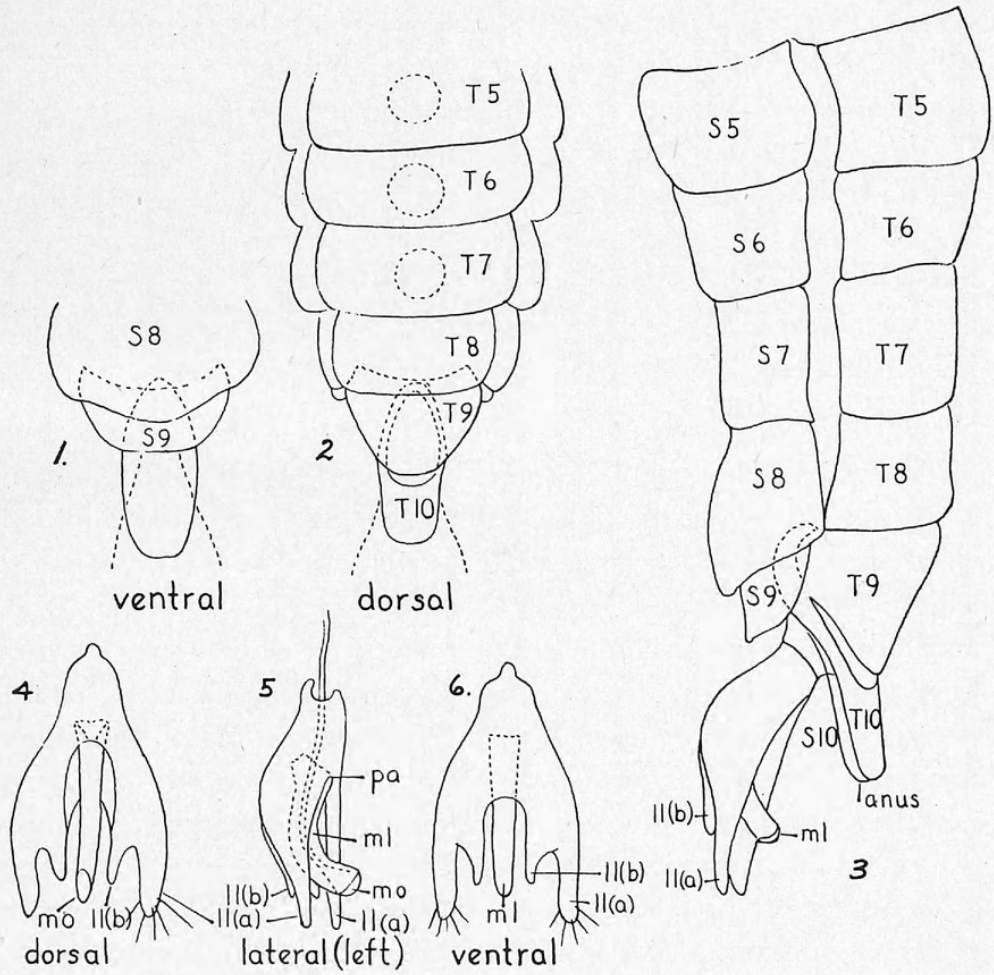
States National Museum. Drawings of the aedeagi of *Telegeusis nubifer* and of *Micromalthus debilis* made by the late F. Muir and sent to me shortly before his death are here offered (fig. 1-9). The abbreviations labeling the parts are those adopted by Sharp and Muir, 1912 (*op. cit.*, p. 481, 482) except that the letter "a" indicates the medially produced and united inner process from the bases of the lateral lobes, similarly indicated as "a" in their treatment of *Atractocerus africanus* (*op. cit.*, p. 542, and fig. 150).

The aedeagi of *T. nubifer* and *schwarzi* are similar, but different preparations appear different according to extent of shrinkage or inflation. The long dorsally concave or flattened apically-rounded lateral lobes appear to embrace the apically-pointed, basally broadly-expanded midventral lobe (indicated by *a*) which arises from the inner bases of the lateral lobes; the side margin and apex of this lobe is raised into a sclerotized carina, within which the upper surface is deeply recessed and membranous; out of this recess arises the slender strongly upturned and curved median lobe with its small subapical ventral functional orifice.

The modified alar venation of *Atractocerus* and of *Telegeusis* appear comparable and derived from the primitive venation of *Lymexylon*, the differences between the first two being such as are necessary for the swift and powerful flight of *Atractocerus* in contrast with that of the feeble Sonoran form.

It is not rare that functional sensory organs by which males are guided to their mates become highly developed and complex in larger and more active forms, as in the maxillary palpi of several genera in this group. The development of similar sensory surfaces on both the enlarged maxillary and labial palpi in *Telegeusis* should not be surprising. It should be remembered that the complex plumose sensory structures of the maxillary palpi of *Hylecoetus dermestoides* Linnaeus, in which the antennae are simple, are absent, in *H. flabellicornis* Schneider, in which similar sensory organs are developed in the antennae which have become biramose. These modifications have been shown very clearly by Germer, 1912 (Zeitschr. f. wissenschaft. Zool. Bd. 101, Heft 4, pp. 683-735).

Opinions on family rank have commonly been based upon structural peculiarities supposed to isolate such units from all related forms, and the peculiarities so obvious in *Telegeusis* in-



Figs. 1-6, *Micromalthus debilis* Leconte. Figs. 1-3, ventral, dorsal and lateral views of part of abdomen of male. Figs. 4-6, dorsal, lateral and ventral views of aedeagus of male. Figs. 7-9, *Telegeusis nubifer* Martin, ventral, lateral and dorsal views of aedeagus of male.

duced Leng, 1920 *(op. cit.,)*, to propose a new family name for it although he left it doubtfully in the superfamily Lymexyloidea. The great adaptive diversity so conspicuous in the few known stages of the very dissimilar genera and species composing this group presents a problem on which opinions will probably continue to differ and will induce conflicting explanations of anatomical details. This diversity is even more complicated by recent reassignment of *Micromalthus* to the Lymexylidae, and if this be accepted the larval modification becomes much more complicated.

But I am surprised at the misinterpretation of the real structure of the leg of first stage *Micromalthus* larva (Jeannel and Paulian, 1944, *op. cit.*, p. 79, fig. 23). In this stage the long tarsus and two claws seem to have survived from the ancestors of the Coleoptera, while all other families, except carabid relatives, have simplified and more or less consolidated these primitive appendages. A distinct tarsus and one imperfectly consolidated claw seem to be present in *Hylecoetus* as well as in *Melittomma,* but in the latter the pair of enlarged spines on the tip of the tibia seem to have been mistaken for lobes of the supposedly consolidated tarsus and claw. One should consider, however, that such comparison of structures of first-stage larvae *(Micromalthus)* with those in advanced larvae of a very different genus *(Melittomma)*, even if the structure were correctly understood, may not be a sound method. We know the first-stage larva of *Hylecoetus* only from the figure by Germer, 1912 *(op. cit.*, pl. 30, fig. 5), in which the leg structure is not clearly shown.

The drawing by Fulmek, 1930 (Treubia, vol. 12, p. 391), is not clear as to leg structure, but illustrates an apically bidentate pygidial plate (tergite 9) in the first-stage larva of *Atractocerus emarginatus* Castelnau. Embryos extracted from eggs laid by a Guatemalan *Atractocerus* show a pointed, broadly triangular pygidial plate (T 9) with long hairs arising from the margin on each side of the apex and with the margin strongly serrate towards its base, legs conventional in form with single claw. The differences between first-stage larvae and those which follow are often great, and attempts should be made to hatch eggs laid by freshly captured females of such interesting and problematical forms.

The affinities of adult *Telegeusis* and *Atractocerus* seem obvious, and similar affinities of larvae of *Atractocerus* and *Lymexylon*

suggest there is no need for a supergeneric name based on *Telegeusis*. Comparable structures in adults of *Telegeusis* and *Micromalthus* might be used to place the latter in the same family, but its highly specialized larval forms do not seem to permit such assignment, and the statement (Jeannel & Paulian, 1944, *op. cit.*, p. 79) that obdominal segment 10 is the same in larvae of *Micromalthus* and *Melittomma* seems to be not true in our samples of these forms. Relationships have been discussed with John R. Bowman, whose evidence indicates *Micromalthus* as the closest relative of *Telegeusis*. The problem cannot be solved, however, until more exact details are available for the various larval stages of the comparatively few genera of these isolated survivors from a primitive ancestral stock.

TELEGEUSIS DEBILIS Horn, 1895, Proc. Calif. Acad. Sci., ser. 2, vol. 5, p. 242, pl. 20, fig. 1; Martin, 1932, Pan-Pacific Ent. vol. 8, p. 91, genotype, monobasic.

The holotype and only known specimen of this species, labeled "Sierra San Lazaro," preserved in the California Academy of Sciences and marked as Lectotype No. 32, is in relatively good condition and agrees surprisingly well with the rather crude original illustration by Horn. It is slender, entirely pale yellow (perhaps a little faded), with head one-half longer than the pronotum which is slightly transverse, three-fifths as wide as elytra and four-fifths as wide as the distance across the eyes. The elytra are narrow, tapering and long, extending one-third of their length beyond the hind coxae; the abdomen plainly shows 9 tergites and what may be the tip of tergite 10 (anus?) projecting from beneath the narrowly rounded pygidium (T 9) as a subcylindrical slightly tapering narrow tube; 8th visible sternite (S 9) is longer than wide, transversely convex and apically rounded. The side margin of the head from the hind margin of the eye to the cervical membrane is one and one-half times the length of the eye.

Horn believed this specimen was a female. When I examined it in July, 1948, its sex was not apparent, but subsequently studied males of other species, in which the aedeagus is concealed within segment nine, display apical segments in agreement with notes I made from this type.

TELEGEUSIS NUBIFER Martin, 1932, Pan-Pacific Ent., vol. 8, p. 91.

I apply this name to the numerous specimens from Arizona and Lower California which show more or less infuscation, and short elytra extending to above the apex of the hind coxae. It is not now practicable to attempt division of this assemblage. Much better evidence than is now available should be obtained.

The holotype (No. 2467, California Academy of Sciences) is labeled "San Pedro Riv. Fairbanks, Ariz., Sept. 6, 1927, J. A. Kusche."

Telegeusis schwarzi Barber, new species

Entirely pale yellow except eyes and palpi, elytral apices and posterior margin of pronotum whitish; elytra only about one-seventh longer than their combined width across humeri, their apices reaching only to lateral base of hind coxae and more broadly rounded than in *T. nubifer*. Length 5 to 8 mm., dry. The caustic treated specimen mounted in balsam distended to 10 mm.

Holotype and three paratypes: U. S. National Museum Cat. No. 59816. Holotype (slide) and one paratype: Hot Springs, Arizona, 26 and 27 June, 1901, collected by E. A. Schwarz in memory of whom the species is named. Three paratypes: Globe, Arizona, July 3, 1949, F. G. Werner, one of them returned to Werner.

Very similar to *T. nubifer* but paler, slightly broader, the antennal joints slightly stouter, the sides of the pronotum more deeply emarginate at middle, the gula narrower.

The simple differences suggested in the following key do not apply entirely to certain males which are tentatively regarded as variants of *T. nubifer*. The very wide area occupied by what seems to be this most abundantly represented "species" may be misleading owing to the present inability to distinguish actual species among the shrunken and distorted males. If the as yet unknown females are sedentary in their habits or are, by inheritance, attracted to different kinds of host plants for oviposition, we will need a different taxonomic treatment of species.

Key to the Recognized Species of Telegeusis

1. Elytra tapering, narrow, subacute and long, extending one-third their length beyond the hind coxae; head much longer than the pronotum. Sierra San Lazaro, Baja California (? 10 mi. NW. of San Jose del Cabo) ..... *T. debilis* Horn

   Elytra short, arcuately truncate, not passing apex of hind coxae; head but little longer than pronotum 2

2. Elytra reaching apex of hind coxae or about a third longer than their width across humeri, their apices infuscate. Arizona and Baja California ..... *T. nubifer* Martin

   Elytra shorter, their apices reaching only to base of hind coxae and not infuscate, the width across humeri nearly equal to elytral length. Central Arizona ..... *T. schwarzi* Barber