

MORPHOLOGY OF THE GENITAL STRUCTURES OF SOME
INDIAN ANOBIIDAE AND PTINIDAE. (COLEOPTERA,
BOSTRYCHOIDEA).

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Although Pic¹ as early as 1912, recognized Anobiids and Ptinids as two distinct families, Imms in his Text Book of Entomology included Ptinids under Anobiids. Joy² separated the two families mostly by their antennal characters. Crowson³, however, placed both the families under the Super-family Bostrychoidea and gave the adult and larval characters which separate the two families. Unfortunately, the proper homology of the genital structures, both males and females, of the two families remained either undescribed or insufficiently treated.⁴ An attempt has, therefore, been made in the following pages to describe in detail the structure of genitalia of some well represented Indian genera and species of the two families. The results obtained indicate that the genitalic characters are not only useful for separating the two families but appear on the whole to be equally dependable or more so in distinguishing the various genera and species. Well determined Indian forms of the two families in sufficient numbers were, however, not available for such studies so that they were confined to three genera of Anobiidae represented by three distinct and well distributed species and only one genus of Ptinidae, represented by single species.

Anobiids are of economic importance in that they are known to injure a wide range of stored materials attacking beans (dried), tobacco products (cigarettes, cigars), spices, ginger, biscuits, flour, bread, many drugs including opium and aconite together with a variety of other food products. The genus *Gastrallus*, on the other hand, represents the book-worm. Although accurate data as regards the damage caused by this insect pest to library books and stored documents are not available, it can, however, be assumed that the damage caused by this insect borer is appreciable.

Ptinids of the genus *Gibbium*, on the other hand, are known to affect the wheat grains, Belladonna and, like genus *Gastrallus*, it is also known to attack book covers. Some are also known to infest birds' nests.

The specimens of three species of Anobiidae, namely, *Lasioderma serricorne* F., *Gastrallus indicus* Reitt., and *Stegobium*(=*Sitodrepa*) *panicca* L., and one species of Ptinidae, namely, *Gibbium psyllioides* Czemp, were examined.

¹ Pic, M. (1912).—"Coleopterorum Catalogus". Anobiidae and Ptinidae, W. Junk, Berlin.

² Joy, N. H. (1932).—"A Practical Hand Book of British Beetles". H. F. & G. Witherby, London.

³ Crowson, R. A. (1951).—*Ent. Month. Mag.* No. 137, pp. 152-156.

⁴ Buck, F. D. (1950).—*Ent. Month. Mag.* No. 124, pp. 127-128.

Buck figured the male genitalic structures of an Anobiid, *Grynobius excavatus* Kug., unfortunately, he has neither homologized, nor the parts were properly delimited. However, from Buck's figure it appears that the genus *Grynobius* is allied to the Indian genus *Gastrallus*. Sarp and Muir (1912) in *Trans. Ent. Soc. Lond.*, Part III have given some figures of genitalia of Anobiidae but they seem to have considered Ptinids under Anobiidae.

The named specimens were obtained from the National Pusa Collection of the Indian Agricultural Research Institute, New Delhi. The details of the host records quoted herein have been noted down from the labels affixed to the specimens. The specimens of *Lasioderma serricorne* F., were available in the collection from Ajwan, Aniseed, Cinnamon, Cardamom (in storage), *Coriandrum sativum* (in storage), cotton seed (in storage-larvae), coconut cake (in storage), Date (in storage), kusum flower cake (in storage), nutmeg (boring in storage), *Peucedenum graveolens* (seeds in storage), plantain leaf, *Poinciana regia* (pod poppy petals) (pressed), poppy leaf (wrappings), ("Shaftal" leaves, larvae), tobacco packets, cigarettes (in tin), cigar-"cheroot", turmeric dry (in storage); of *Gastrallus indicus* Reitt., from paste-board, book, cover of books; of *Stegobium* (= *Sitodrepa*) *panicea* L. from Aniseed (in storage) and Cummin seed (in storage); and of *Gibbium psyllioides* Czemp., from *Belladonna*, wheat grain (in storage) and Bird's nest.

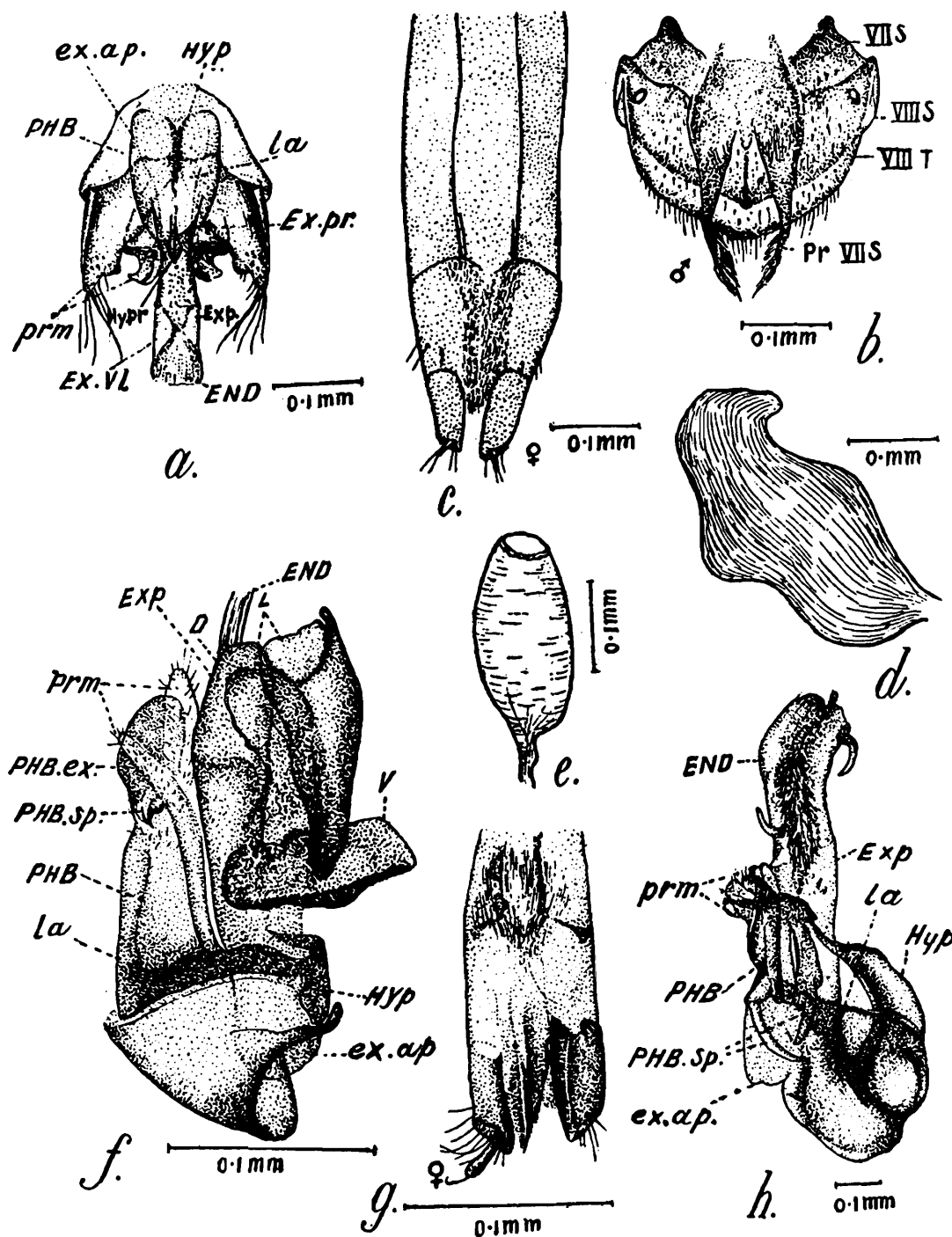
ANOBIIDAE

Gastrallus indicus Reitt.

MALE. (Text-fig. 1, a. b.)

The lateral arches (Text-fig. 1 a) of each side not distinct as in the case of Bruchidae; the basal portion of the paramere (*prm*) of each side descends rather indistinctly as lateral arches ventrad and joins with its pair of the opposite side thus forming a rather thin ridge from which a small feeble-shaped hypomere (*Hyp*) originates; the parameres of each side, basally broad and sub-triangular, its distal one-third forked or paired on each side, the latero-ectad part thickly built, excavated entad at distal one-third and bears a shallow notch at the middle dividing the paramere into an inner tubercular part and a finger-shaped process ectad fringed with longish hairs; inwardly near about the middle, it bears a few short hairs, the portion laterad to the exophallus arises from the excavity at the base of the paramere of each side, subtriangular and hollow structurally, its distal tip ending in a pair of closely apposed hooks, the entire structure joins angularly on each side with the main body of the paramere by a narrow perpendicular ridge formed by a pair of laminated plates. The dorsal part of the paramere at the base represents the phallobase (PHB) and between somewhat indistinguishable dorsal (phallobase) and latero-ventral arches (lateral arches) runs the prominent exophallus (*Exp*) somewhat narrower at the base but broader distally; the exophallus at its distal half deeply chitinized and bears near about the middle a pair of laminated processes with their pointed tips directed cephalad (*Ex.pr.*), distally the exophallus bears in the middle sparsely distributed hairs, the exophallic valve (*Exvl*) at the tip of the exophallus triangular in shape with its margin rounded off, the exophallic valve gives support to the fairly large cylindrical endophallus (END) well spread out when evaginated; the distal half of the endophallus is deeply chitinized internally and bears a cone-shaped appearance at the spread-out tip of which the gonopore opens. In continuation of the exophallus, the sub-ellipsoidal exophallic apodeme (*ex.ap*) extends

beyond the tenth segment, cephalad it bears notch just mesodorsad to the indistinct hypomere, the narrower distal end of the hypomere bears a distally clubbed but pointed peculiar structure the hypomeral prong (Hy pr.) which apparently supports the base of the well developed exophallus and enclosed endophallus, the tip of this prong extends beyond the anterior margin of the exophallic apodeme. This slender rod-like



Text-fig. 1. *Gastrallus indicus* Reitt. a. ♂ genitalia, END—endophallus; Ex. ap.—exophallic apodeme; Exp—exophallus; Ex. pr.—prongs of exophallus; Ex. vl.—exophallic valve; Hypr.—hypomere; Hyp.—hypomeral prong; la—lateral arch; prm.—parameres. b. VII S, VIII S—7th and 8th Sternites; pr. VII S—prongs of 7th sternite; VIII T—8th tergite. c. ♀ genitalia. d. ♀ bursa copulatrix. e. ♀ spermatheca. f. *Stegobium* (= *Sitodrepa*) *panicea* L. ♂ genitalia, END—endophallus; ex. ap.—exophallic apodeme; Exp. exophallus (with D. L. V.—dorsal, ventral and lateral valves); Hyp—hypomere; PHB—phallobase; PHB. ex.: Phallobase (expanded part); PHB. sp.—spines on phallobase; la—lateral arch; prm.—paramere. g. ♀ genitalia. h. *Lassioderna serricorme* F. ♀ genitalia; END—endophallus; ex. ap.—exophallic apodeme; Hyp—hypomere; PHB—phallobase; PHB. sp.—Spines on phallobase; la—lateral arch; prm. paramere.

structure according to Sharp and Muir (1912)¹ present also in *Ptilinus pectinicornis*. The hypomeral prong appears to vary in size in *Gastrallus indicus* Reitt.

The entire ninth and tenth segments remain covered up by the arch-shaped eighth segment as also by a pair of sub-triangular median processes (Text-fig. 1, *b*) which taper off distally (Pr VIIs), these processes appear feathery being furnished with longish hairs entad.

FEMALE. (Text-fig. 1, *c, d, e.*)

Tenth segment appears as separate plates dorsally with sparsely distributed longish setae on distal two-thirds, the inner and outer margins of the pair of plates almost parallel, meso-ventrad to the plates fine and compact backwardly directed setae in large numbers visible.² The plates of the tenth segment converge to a point at the tip and appear closely apposed, their distal extremities reaching half the length of the first segment of the cercus; first segment of cercus sub-cylindrical, slightly curved and nearly equal in thickness, its distal tip angularly excavated ectad, the excavated area bears medium-sized long hairs; the second segment comparatively smaller, sub-cylindrical and appears slightly dilated at the distal end which bears longish hairs. Bursa copulatrix (*d*) saccular, slightly curved at the distal end. Spermatheca sub-ellipsoidal (*e*), its distal margin furnished with a circular rim.

Stegobium (Sitodrepa) panicea (L).

MALE. (Text-fig. 1, *f.*)

The lateral arch (*la*) of each side more or less distinct and descends ventrad almost perpendicularly from the phallobase (PHB), on each side they appear as arcs, ventrad they meet to form a short, stumpy convex hypomere (Hyp) which projects anteriorly and fits in with the ventral condylar portion of the ninth segment. The phallobase (PHB) fairly conspicuous. From the latero-ventral border of the lateral arches somewhat laterad to the exophallus originates, finger-shaped and rather long, left paramere (*prm.*); it is more or less uniform in thickness and somewhat curved near about the middle, distally slightly narrower and rounded off, with sensory hairs distributed over distal two-thirds; the right paramere thicker, considerably shorter than the left and spatulate, it arises ventrad to the leaf-like distal projection of the phallobase (PHB. *ex*) from its anterior margin and furnished almost throughout its length with short sensory hairs; at the base of the leaf-like extension of the phallobase, a pair of thick set spines visible (PHB *sp.*), proximally their pointed ends closely apposed. In contrast to the genus *Gastrallus* the exophallus (Exp) appears considerably modified so much so that three separate sclerites distinguishable, which appear to work in unison, the convex dorsal part (D) covers the endophallus (END) which when everted appears as a short, thin-walled projected process longitudinally striated in appearance, the lateral part of the exophallus (L) form the

¹Sharp, D., and Muir F., *Trans. ent. Soc.*, London. part III, p. 534 (1912).

²This setal arrangement of the tenth segment appears to be characteristic of the two families.

latero-ventral support of the composite exophallus, while the narrow winnow shaped portion (V) supports the latero-ventral (L) and dorsal (D) parts of the composite exophallus, the ventral part apparently acting as a fulcrum. The exophallic apodeme (ex. ap.) when present not distinct and apparently remains covered up by the ninth tergite. The ninth tergite bears a finger-shaped slightly curved process, its curved portion fits in with the projection of the hypomere (Hyp).

FEMALE. (Text-fig. 1, *g.*)

Tenth segment subquadrate, the division between the two plates on the dorsum appears incomplete as compared with the other genera, the fine suture running upto the distal two-thirds, the two portions run closely apposed and end almost to a point. The first segment of right cercus sub-cylindrical slightly dilated at the tip with an angular excavity ectad, the excavity furnished with fine setae ectad and entad ; the second segment originates from the distal excavity of the first and about half the length and one-third the thickness of the first with a fine long curled hair at the tip ; left cercus single jointed, sub-cylindrical and appears excavated entad throughout, with the distal end rounded off, its proximal edge bears inwardly a transverse notch the entire left cercus appears more deeply pigmented as compared to the right.

***Lasioderma serricorne* F.**

MALE. (Text-fig. 1, *h* ; Text-fig. 2, *a, b.*)

The lateral arches (*h*) appear to emerge from the phallobase (PHB) as a thin subtriangular lamina on each side progressively narrowed anteriorly, distally they surround the circular foramen ; exophallus (Ext) more or less tubular proximally somewhat oblique and uniform in thickness, no valve traceable on the exophallus ; exophallic apodeme (*ex.ap*) when present not broad and laminated ; the hypomere (Hyp) does not appear to be fused with the lateral arches, in fact, a thin suture present between them, distally the hypomere abruptly narrows to a point and its tip remains fused with the ventral region of the phallobase ; the phallobase peculiar in that it bears a two jointed process (PHB.*sp.*) the basal joint of which distinctly thicker than the terminal finger-shaped segment ; the parameres (*prm*) of each side peculiar in being trilobed (Text-fig. 2 *a.*) the three lobes differing from one another, the first (I) spatulate, narrow at base, concave and bears on its surface a large number of setae apparently sensory in function, the second (II) broad somewhat hollow at the base, finger-shaped, slightly curved and more or less uniform in thickness, the (I) and (II) appear to originate together from a common stem but the distal half of (II) remains very closely associated and enclosed within the groove of the third ; the third lobe (III) of the paramere peculiar in that its wall of one side near about the middle perpendicular to its long axis, this portion of (III) encloses the distal half of (II), the raised portion distally well rounded off and bears a distinct notch near about the tip, the raised portion of (III) enclosing (II) apparently prevents displacement and keeps the parameres in position, a

few hairs traceable near about the base and distal portions of (III), near about the tip of (III) a small but distinct tubercle traceable; the endophallus appears slightly curved near about the tip and when everted appears polymorphic at the terminal end, the endophallus bears inwardly characteristic groups of setae (Text-fig. 1, *h.*) and spines (Text-fig. 2, *b.*) of various shape and size, these act as claspers.

FEMALE. (Text-fig. 2, *c, d, e.*)

Tenth segment dorsally represented by a pair of broad plates which appear subquadrate and somewhat convex, narrower and rounded off at the distal margin; just meso-ventrad of the plates of tenth segment, fine backwardly directed setae in longitudinally placed compact group traceable, distad the plates furnished with a few short as also longish hairs; first segment of the cerci large, well rounded off distally and the tip excavated slantingly ectad, the excavated area bearing a few longish hairs, hairs present anteriorly on the body of the first segment, the second segment of the cerci subcylindrical, minute and vestigial bearing a few fine hairs at the tip; Bursa copulatrix, saccular, large with a pair of distinct circular cup-like structures (*d*, bu. cu.); spermatheca sub-ellipsoidal with a thick circular cap-like structure on top (*e*).

PTINIDAE

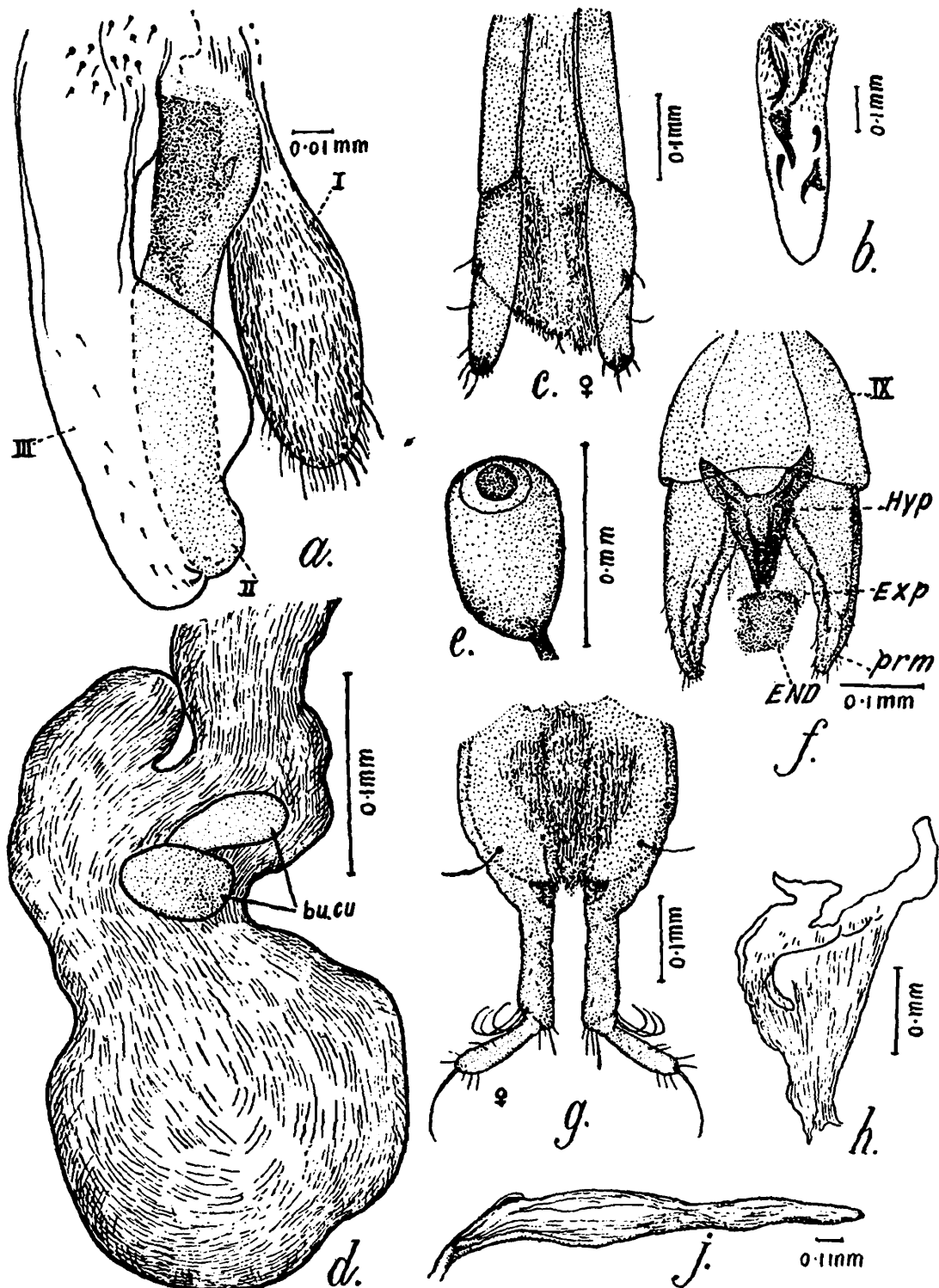
Gibbium psyllioides Czemp. 1778-(*scotias* F. 1781).

MALE. (Text-fig. 2, *f.*)

The male genitalia as compared to the Anobiids extremely simple. The parameres (*prm*) thick at base and tapering distally, sub-triangular, slightly curved distad with a broad groove running entad; thickly built hypomere (*Hyp*) tridradiate, the two proximal prongs directed angularly anterolaterad beyond the distal border of the ninth sternite; the distal median one thicker at the base, sub-triangular, with its narrow pointed end directed mesially distad, its distal margin reaching nearly the entire length of the thick set broad cylindrical exophallus; proximal half of the paramere appears to be intimately fused with the tenth segment ventrally with no trace of any lateral arches, between the prongs of the proximal arms of hypomere, a small roundish process present mesially, a small ellipsoidal perforation present in the hypomere dorsally which appears to communicate ventrally with a median longitudinal slit dividing the hypomere into two separate parts; apparently the well developed hypomere supports the fairly large exophallus; the cylindrical exophallus (*Exp*) with a wide circular opening at the tip and a fine longitudinal slit ventrad just above the distal prong of the hypomere; the endophallus (*END*)-the everted part broad, sub-cylindrical with its distal rim slightly narrower, no endophallic armature traceable.

FEMALE. (Text-fig. 2, g. h. j.)

Tenth segment subquadrate dorsally, with its inner margin more or less straight, mesoventrad the plates bear compact



Text-fig. 2—*Lasioderma serricorne* F., a., parameres; b., exophallic armatures; c., ♀ genitalia; d., bursacopulatrix; e., Spermthaca; f., *Gibbium psyllioides* Czemp. ♂ genitalia, END—endophallus; Exp—exophallus; HYP—hypomere; prm—paramere; g. ♀ genitalia; h. spermthaca; j. bursa copulatrix.

longitudinal group of backwardly directed setae; the first segment of the cerci large, sub-cylindrical and nearly equal in thickness, with its basal part excavated entad while the distal margin excavated angularly ectad, the excavity bearing longish hairs some of which extend beyond the second segment of the cerci, the second segment

sub-cylindrical well developed somewhat narrow anteriorly, and distally well rounded off bearing a group of short and longish hairs, the hairs on the distal extremity being definitely longer, the second segment appears to be set nearly at right angles to the first. Bursa copulatrix (*j*) elongated and saccular in a collapsed condition. Spermatheca appears irregularly shaped in a collapsed condition, a pair of polymorphic processes present at the two distal corners (*h*), the spermatheca opens at a distance of one-third proximal from the base.