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A Proposed Classification of the Hemiptera.

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For nearly ten years, the writer has made the *Hemiptera* the object of special study, and below is submitted for the consideration of those interested in these pungent insects, a proposed arrangement of the Divisions and Families recognized, in accordance with what is conceived to be their natural affinity and natural sequence, based on evolutionary law.

Whether or not, the arrangement be accepted, it is believed that the student will find the analytical tables useful and valuable.

It will also be observed that the *Pediculidæ*, by some authorities classified with the mites *Acarina*, are included among the *Heteroptera*; although some systematists, while classifying them as hemipterous, considered them to rank as a suborder under the name *Parasitica*.

This arrangement, I have not followed, for the reason they seem to me, to be too closely related, in habits and structure, to the heteropterous families *Polyctenidæ* and *Cimicidæ*, to justify their separation.

In general appearance, too, they so closely resemble—in a remarkable degree—the immature forms in the homopterous family *Coccidæ*, that they very naturally bridge the chasm separating the *Homoptera* from the *Heteroptera*, and afford—by placing them at the head of the *Heteroptera*, as has been done—the presentation of a natural consecutive sequence of all the hemipterous families

Before giving the characters for separating the divisions and families of the *Hemiptera*, it may be advisable to show the position and rank it is believed that this order should occupy in any natural scheme of arrangement of the so-called orders of insects, based on evolutionary law.

I believe that the class *Insecta*, or those expressions of life classed by Zoologists as such—animals breathing through *tracheæ*—is represented to-day by two groups that came into existence in two distinct ways, being evolved, the one from the *Crustacea*, the other from the *Vermes*, which may be distinguished by the following very simple character:

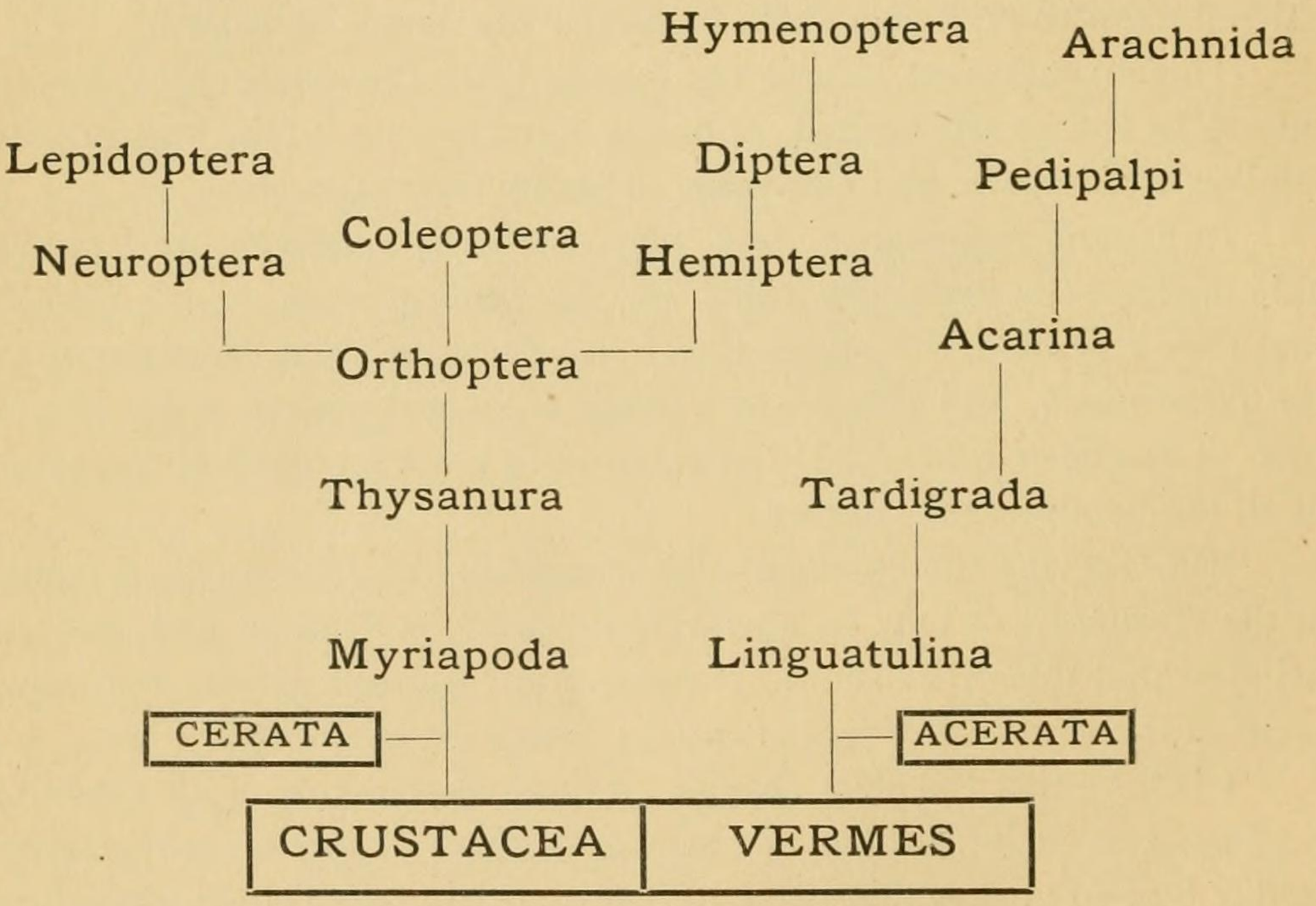
Insects with antennæ.....**Cerata** *m*
Insects without antennæ.....**Acerata** *m*

The first group, or *Cerata*, originated from a crustacean ancestor and is represented to-day by the *Myriapoda*, *Thysanura*, *Orthoptera*, *Neuroptera*, *Lepidoptera*, *Coleoptera*, *Hemiptera*, *Diptera*, and *Hymenoptera*; while, the second group or *Acerata*, evolved from an ancestral worm-like form, is represented by the *Linguatulina*, *Tardigrada*, *Acarina*, *Pedipalpi* and *Arachnida*.

The simple character given above—with or without antennæ—will enable any one to place at a glance any *insect* in its proper group. The groups *Pediculina*, *Mallophaga* and *Physopoda* (= *Thysanoptera*, Hal.), therefore belong naturally to the orders originally assigned them by Burmeister: the former, on account of their promuscidate mouth, go with the *Hemiptera*; and the two last, on account of their mandibulate mouth and active pupa, go with the *Orthoptera.*

The following diagram, will demonstrate the relative position, that it is believed the different orders should occupy in a natural scheme, and it may be well to compare it with a similar one, in the "Third Report of the U. S. Entomological Commission," page 295, to see how different is our conception of a natural arrangement, from that entertained by its learned author, Dr. A. S. Packard.

INSECTS GENEALOGICAL TREE.



A classification is at once demonstrated to be either good and natural, or false and artificial; and its merits are soon recognized.

The good and natural is accepted; the false and artificial eliminated or rejected.

It is not thought advisable, therefore, at this time, to enter into the merits or demerits of the many different classificatory schemes proposed for the arrangement of the *Hemiptera*; they are familiar to all students and nothing is ever accomplished by such discussions.

The following is our proposed arrangement of the Divisions and Families:

ORDER **HEMIPTERA**.

Mouth promuscidate; metamorphosis incomplete.

SUBORDERS.

Wings uniformly membranous or horny ..... Suborder I, **HOMOPTERA**.
Front wings basally horny, apically membranous; hind wings membranous.... Suborder II, **HETEROPTERA**.

SUBORDER I, **HOMOPTERA**.

TABLE OF DIVISIONS.

Beak issuing from the inferior part of the head ..... Div. I, **AUCHENORHYNCHA**, A. et S.
Beak apparently issuing from the sternum ..... Div. II, **STERNORHYNCHA**, A. et S.

Division I, **AUCHENORHYNCHA**, Amyot et Serville.

TABLE OF THE FAMILIES.

Front wings most frequently opaque or parchment-like; hind wings membranous.. 2
All wings most frequently membranous or horny, strongly areolated.
*Ocelli 3 on the vertex; antennæ setiform, placed between the eyes; thorax normal; fore femora thickened, toothed beneath; males musical..... Fam. I, **Cicadidæ**.
Ocelli most frequently 2, usually placed beneath the eyes or in hollow cavities in in the cheeks, a 3rd ocellus sometimes on the front; antennæ always placed beneath the eyes; frons often produced, carinated... Fam. II, **Fulgoridæ.
***Ocelli 2 on the crown; antennæ between the eyes; thorax abnormally developed, usually completely covering the scutellum; legs foliaceous, prismatic or rounded ..... Fam. III, **Membracidæ**.
2 Thorax normal; ocelli 2, seldom absent; antennæ setiform, placed between the eyes.
†Ocelli always placed somewhere on the vertex..... Fam. IV, **Cercopidæ**.
††Ocelli always on the frons and below the superior margin..... Fam. V, **Bythoscopidæ**.
†††Ocelli in front of the eyes on the rounded edge of the superior margin, but never on the vertex..... Fam. VI, **Jassidæ**.

Division II, **STERNORHYNCHA**, Amyot et Serville.

TABLE OF THE FAMILIES.

Tarsi 1-jointed..... 2
Tarsi 2-jointed.
Beak 3- or 4-jointed; wings most frequently membranous.
Antennæ 10-jointed; abdomen without honey tubes..... Fam. VII, **Psyllidæ**.
Antennæ 3- to 7-jointed; abdomen frequently with honey tubes..... Fam. VIII, **Aphididæ**.
Beak 2-jointed; wings opaque, farinose..... Fam. IX, **Aleurodidæ**.
2 Males with only 2 wings, seldom apterous; females always apterous, mite-like; antennæ 6- to 11-jointed; and all the species reach maturity under waxy secretions, filamentary down or in galls..... Fam. X, **Coccidæ**.

Suborder II, **HETEROPTERA.**

TABLE OF DIVISIONS.

Posterior coxæ acetabulate, rotating, with no femoral grooves..... .....
Div. I, **TROCHALOPODA**, Schiödte.
*Claws terminal,..... ..Subdiv. I, GEODROMICA, Ashmead.
**Claws superposed ..... Subdiv. II, HYDRODROMICA, Ashmead.
Posterior coxæ hinged, provided with femoral grooves..... ....
Div. II, **PAGIOPODA**, Schiödte.
†Antennæ always plainly visible .. ..Subdiv. I, GYMNOCERATA, Ashmead.
††Antennæ hidden under cavities of the head.....
Subdiv. II, CRYPTOCERATA, Ashmead.

Division I, **TROCHALOPODA**, Schiödte.

Subdivision I, GEODROMICA, Ashmead.

ANALYTICAL TABLE OF THE FAMILIES.

Winged : or if wingless with ocelli and always with a jointed beak 2
Wingless, ocelli wanting.
Beak not jointed ; anterior tarsi 2-jointed.....Fam. XI, **Pediculidæ.**
Beak jointed.
*Antennæ short, 4-jointed, last joint fusiform ; beak 4-jointed ; anterior tarsi 3-jointed .....Fam. XII, **Polyctenidæ.**
**Antennæ long, last joint long, setiform ; clypeus triangular..... ...
Fam. XIII, **Cimicidæ.**
2 Beak reposing in a groove.....3
Beak not reposing in a groove.
Elytra composed of a single piece, the membrane not being separated..... .....
Fam. XIV, **Ceratocampidæ.**
Elytra composed of corium, clavus, embolium, cuneus and membrane, seldom wanting ; clypeus elongated ; beak 3- or 4-jointed, tarsi 2- or 3-jointed.....
Fam. XV, **Anthocoridæ.**
3 Fore legs raptorial ; or then body surrounded with foliaceous plates.....4
Fore legs not raptorial ; tarsi 2-jointed.
†Elytra with reticulated nervures ; third antennal joint normal ; body very flat..
Fam. XVI, **Aradidæ.**
††Elytra strongly areolated, frequently vitreous ; third antennal joint abnormally lengthened; thorax strongly vesiculose or carinate..Fam. XVII, **Tingitidæ.**
4 Body often high, most frequently angulate ; elytra with remose nervures ; terminal antennal joint longest and thickest, fusiform.....Fam. XVIII, **Phymatidæ.**
Body very flat, surrounded by foliaceous plates or scales ; scutellum reaching nearly to the top of the abdomen..... .. ..Fam. XIX, **Phlœidæ.**
Body most frequently elongated, elongate oval or linear ; scutellum small triangular or wanting ; while the antennæ excepting in the family *Nepidæ*, are plainly visible throughout their entire length 5
Body usually rounded, oval, or oblong oval, convex or highly convex ; the scutellum always large, frequently covering the entire abdomen ; while the basal joint of the antennæ is more or less hidden by lateral projections of the head.
*Scutellum usually short, flat, triangular, seldom lengthened, sometimes with a rounded tip.
Tibiæ strongly spined, or dilated .....Fam. XX, **Cydnidæ.**
**Scutellum large, convex, quite or nearly covering the whole abdomen.

Tibiæ spinous ; tarsi 3-jointed .....Fam. XXI, **Corimalænidæ.**
Tibiæ not spinous.
Elytra folded ; tarsi 2-jointed .....Fam. XXII, **Arthropteridæ.**
Elytra straight ; tarsi 3-jointed.....Fam. XXIII, **Scutelleridæ.**
***Scutellum flattened, attenuated, usually rounded at tip, or long triangular, but not nearly covering the whole abdomen.
Tibiæ not spined ; tarsi 2- or 3-jointed .....Fam. XXIV, **Pentatomidæ.**
5 Beak curved at base ; head cylindrical ; prothorax with a transverse suture.....7
Beak not curved at base ; head not cylindrical.
Antennæ inserted on a line below the eyes.....6
Antennæ inserted on a line before the eyes.
Membrane always with more than five nervures, often numerous.
*Legs not especially slender, most frequently thickened, spined or foliaceous ; forms various ..... Fam. XXV, **Coreidæ.**
Legs long and slender, femora clavate.....Fam. XXVI, **Berytidæ.
6 Membrane with not more than five nervures.
With ocelli .....Fam. XXVII, **Lygæidæ.**
Without ocelli .....Fam. XXVIII, **Pyrrhocoridæ.**
Membrane with one or two cells ; no ocelli..... Fam. XXIX, **Capsidæ.**
7 Head separated from the prothorax.
‡Anterior legs not raptorial ; fore coxæ not greatly lengthened.
Beak usually long, slender, 4-jointed .....Fam. XXX, **Nabidæ.**
Beak usually short, stout, 3-jointed.....Fam. XXXI, **Reduviidæ.**
‡‡Anterior legs raptorial ; fore coxæ greatly lengthened .....
Fam. XXXII, **Emesidæ.**
Head not separated from the prothorax.
Abdomen ending in long, respiratory caudal setæ ; antennæ very small, 3-jointed .....Fam. XXXIII, **Nepidæ.**

Subdivision II, HYDRODROMICA, Ashmead.

Head inserted in prothorax.
Head abnormally lengthened .....Fam. XXXIV, **Hydrometridæ.**
Head not greatly lengthened.
*Ocelli and scutellum present .....Fam. XXXV, **Gerridæ.**
Ocelli and scutellum wanting .....Fam. XXXVI, **Velliidæ.

Division II, **PAGIOPODA,** Schiödte.

Subdivision I, GYMNOCERATA, Ashmead.

Elytra areolated.....Fam. XXXVII, **Saldidæ.**

Subdivision II, CRYPTOCERATA, Ashmead.

Body boat-shaped, supinate.....2
Body depressed, prone.
Legs not natatorial ; ocelli present.
Eyes pedunculate..... .....Fam. XXXVIII, **Galgulidæ.**
Legs natatorial ; ocelli wanting.
Scutellum large.
Abdomen without strap-like caudal setæ..... Fam. XXXIX, **Naucoridæ.**
Abdomen with strap-like caudal setæ .....Fam. XL, **Belostomidæ.**
Scutellum invisible or minute.
Head overlaps prothorax.....Fam. XLI, **Corisidæ.**
2 Head inserted in prothorax ; legs natatorial .....Fam. XLII, **Notonectidæ.**