Silvestri und Dewitz, zwingen uns zu einer bedeutenden Änderung der allgemeinen Anschauung über die Malpighischen Gefäße als ausschließliche Excretionsdrüsen. Im hier beschriebenen Falle haben wir es vielleicht mit einer entgegengesetzten Funktion zu tun, d. h. mit einer Secretionsfunktion. Die in den Malpighischen Gefäßen gebildeten Stoffe häufen sich während dem Larvenleben in ihnen an, um schließlich nicht in Form untauglicher Produkte abgegeben, sondern gänzlich zum Bau des die *Phytonomus*-Larve schützenden Kokons verbraucht zu werden.

2. The Ground Plan of a Typical Thoracic Segment in Winged Insects.

G. C. Crampton, Ph. D.[1].

(With 1 figure.)

eingeg. 8. Januar 1914.

The "ground plan" of a wing-bearing thoracic segment shown in the accompanying figure represents an hypothetical composite type, to which the thoracic segments of any insect can be referred as a basis of comparison, rather than an attempted reconstruction of the original condition of the thoracic sclerites in the ancestors of winged insects. Most of the primitive features, however, are included in the figure, and to these have been added conditions found in the more specialized insects. As here represented, the typical thoracic segment is not compound, or composed of subsegments, since the writer is convinced that all of the "compound-segment" theories are unfounded. The three thoracic segments of the adult insect represent the three thoracic segments of the embryo — and no more.

Contrary to the prevalent conception of the origin of the thoracic sclerites, these were not formed by the breaking up of solidly chitinized rings (forming the body wall of the segments) as Woodworth, 1906, maintains; but originated as isolated plates, formed by the stronger deposition of chitin and pigment in the softer body wall, due to the stimulus of muscular tension and mechanical stimuli. This is well shown in larval insects (e. g. Carabidae) and in the lower forms such as *Japyx*, *Embia*, and particularly the Myrientomata, figures of which were very kindly shown me by Dr. Prell, who is about to publish a paper dealing with the thoracic sclerites of these interesting insects. In the higher insects, certain of these plates unite to form continuously chitinized areas which are subsequently subdivided by the formation of secondary sutures (i. e. those not originally present) which tend to mask the original condition.

[1] Contribution from the entomological laboratory of the Massachusetts Agricultural College, Amherst, Mass.

General Terminology.

Despite the contention of Snodgrass, 1910a, the terms dorsum, latus, and venter should refer to the back, side, and belly of the entire insect (Smith, 1906), while the terms tergum (or notum), pleuron, and sternum should be used to indicate the entire dorsal, lateral, and ventral regions of a single segment. Sclerites of the tergal or notal region are called tergites; those of the pleural region are called pleurites; and those of the sternal region are termed sternites.

The term suture may be applied to impressed lines, or to the space between approximated plates, or to the constriction between consecutive segments, or to the line formed by the approximated external lips of an inpocketing or infolding of the body wall. The internal ridge formed by such a fold may be called an implex (or implica). The transverse implex, or internal fold, of the dorsal region between two consecutive segments is called a phragma. The phragma being formed as an infolding of the body wall, is composed of two more or less closely appressed lamellae. If the anterior lamella of the two forming the phragma, is strongly chitinized, while the posterior one is membranous, the phragma appears to belong entirely to the segment in front; if the posterior lamella is strongly chitinized, while the anterior one is membranous, the phragma appears to belong entirely to the segment behind it. The implex between the pleurites *es* and *em* (fig. 1) is called an apodeme.

Internal processes (i. e. protuberances or projections which are not ridge like) of the sternal region are termed apophyses. These may occur singly (monapophyses) along the mid-ventral line, or in pairs (diapophyses) one on either side of the mid-ventral line. The unpaired type is illustrated by the spina, or internal process borne on sternite *ss* (fig. 1). The paired apophyses may unite at their bases, while their distal ends remain free, forming the furca or forked internal process borne on sternite *fs* (fig. 1). All internal ridges, processes, etc., are termed the endothorax.

Intersegmentalia.

In front of the principal tergal, pleural and sternal sclerites, are small detached plates called intersegmentalia. These intersegmental sclerites belong partly to the segment in front of them, partly to the segment behind them. The tergal intersegmentals are called intertergites (fig. 1, *it*). They are well developed in such insects as *Corydalis*. The pleural intersegmentals (fig. 1, *ip*) are designated as interpleurites (anterior and posterior). They are easily seen in *Corydalis*; and in *Perla*, they are represented by a number of small plates in the

neighborhood of the spiracle. The sternal intersegmentals (fig. 1, *is* and *cs*) are termed the presternite, and cervical sternites. They are well developed in such insects as *Leuctra*, *Capnia*, etc.

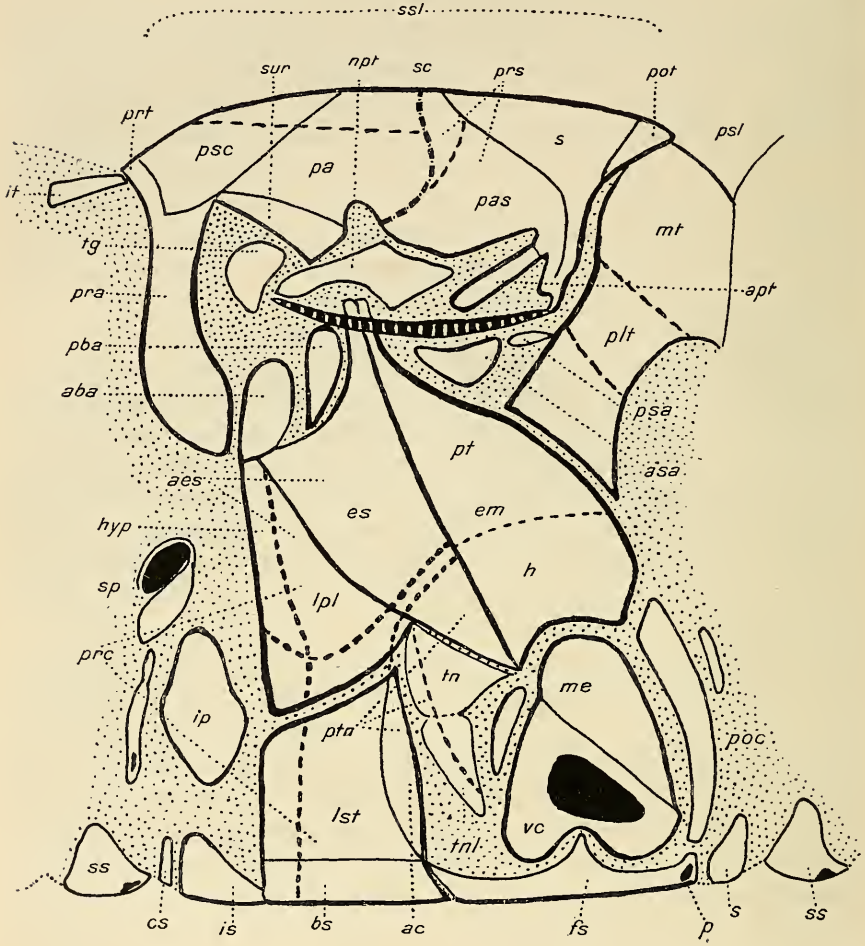

Fig. 1.

The cervical intersegmentals, or those in front of the prothorax, are called cervical or jugular sclerites. The designation "cervicum" was formerly applied to the neck region, since the nominative singular (cervix) of this noun is always used to designate the posterior neck-life region of the head. It is better, however, to use some such compound term as veracervix, for the true neck region. The cervical sclerites are usually represented in the lowest families of all the orders,

but are best developed in the Orthoptera, Dermaptera, Plecoptera, and other primitive insects.

Tergites.

As pointed out by Verhoeff, 1903, and Snodgrass, 1909a, the notum (or tergum) of many winged insects, consists of two plates — a large anterior one, the scutoscutellum (fig. 1, *ssl*), and a smaller transverse posterior one, the postscutellum (*psl*). Snodgrass terms the anterior plate, the notum; but, since the term notum always includes the whole notum, or tergum, it is preferable to use the designation scutoscutellum for the plate in question, which is largely composed of the scutum and scutellum. The posterior plate has always been termed the postscutellum, and there is no advantage in changing its name.

The anterior plate (*ssl*) is sometimes connected with the pleural region by a pre-alar bridge *pra* (prealare), as in certain Plecoptera, but this is usually wanting. The anterior plate bears the wing along its lateral margin, and its posterior margin is continued in the posterior margin of the wing. The posterior plate *psl* lies behind the wing, and is sometimes connected laterally with the pleural region by a post-alar bridge (*plt*).

The anterior plate (Fig. 1, *ssl*) may be subdivided by the formation of infoldings of the body wall (with their external sutures) into the following sclerites. 1) A transverse, narrow, anterior, marginal region *prt* (pretergite) which bears the anterior phragma. It is present in such insects as *Corydalis* and *Periplaneta*, but is often wanting, and is always unimportant. 2) A larger, usually triangular median region *psc* praescutum), well developed in most Hymenoptera, Neuroptera, Corrodentia, etc. It is sometimes narrow, and transverse, instead of triangular (e. g. in *Periplaneta*). 3) A large central region *sc*, the scutum, which sometimes is united with the praescutum (*psc*). In certain Hymenoptera, the fused scutum and praescutum become secondarily marked off by the formation of new sutures (the so called parapsidal furrows of MacLeay, 1830) into a median region not strictly homologous with the praescutum, and two lateral regions *pa*, which MacLeay terms parapsides. A small sclerite *sur* (supraälare or suralare) situated immediately above the wing, is marked off from the scutum. It serves as a pivot for the wing, in the movements of flight. 4) In some Hymenoptera, a transverse region *prs*, the prescutellum, situated immediately in front of the scutellum (*s*), is marked off from the remainder of the scutum, by the formation of a distinct crevice, or cleft, dividing the anterior plate (*ssl*) into two "sub-plates". Emery, 1900, terms the sclerite in question, the "proscutellum"; but the latter term refers to the scutellum of the prothorax (if such exists). It is there-

fore better to substitute the term prescutellum, since this is evidently what Emery intended. In the region just referred to, two sclerites *pas* (parascutellum) are sometimes marked off one on either side of the scutellum. Many insects show traces of these sclerites. 5) The large, usually triangular region *s* (scutellum) which is well defined in most Neuroptera, Hymenoptera, Hemiptera, etc. 6) A narrow, transverse, posterior, marginal region *pot* (posttergite) which is usually represented by a backward-projecting fold, or "reduplication" of the anterior plate *ssl*, in the Orthoptera (the "posterior reduplication" of Snodgrass, 1908). It is a large well marked sclerite in the saw-flies, and is incorrectly designated as the "postscutellum" in these insects (Marlatt, 1896).

The posterior plate *psl*, or postscutellum, usually consists of an external region bearing an internal phragma. The writer (Crampton, 1909) formerly distinguished the external region as the "phragmite" and the internal one as the phragma. The external region ("phragmite") in such insects as the Tipulidae, is divided into a median region *mt*, and two lateral regions *plt* on either side of the median region. The median region was termed the mediophragmite (*mt*) and the two lateral regions (*plt*) were termed the pleurophragmites (anterior and posterior). Mr. Martin, in a paper about to be published, proposes to modify these terms to meditergite and pleurotergite — a suggestion which has much to recommend it, since the latter terms are more euphonious and more expressive.

In connection with the tergites should be mentioned the little plates by means of which the wing veins articulate with the tergal region. Smith, 1906, gives the terms ossicles, osselets, and ossicula for these sclerites (doubtless taken from the term osselets, applied to these alar ossicles by the early French writers such as Jurine, 1820, and Chabrier, 1822). Snodgrass, 1909b, terms them axillaries. The designation pteralia, introduced by Groeschel, 1911, is an exceedingly appropriate term, and will doubtless become widely accepted. The principal pterale, or alar ossicle *npt*, may be designated as the notopterale, since it is the most important one furnishing an articulation between the anterior wing veins and the notum. The adanal pterale (*apt*) is the alar ossicle by means of which the anal veins articulate with the notum. The other alar ossicles may be designated by the name of the veins with the bases of which they articulate.

The shell-shaped cup or scale *tg* at the base of the wing was termed the parapteron or epaulette by Audouin, 1840—1842. The term parapteron has been applied to so many different sclerites that it is perhaps preferable to use the term epaulet, to designate the scale in

question. The designation tegula is applied to it in the Hymenoptera; but in the Diptera, this term would create confusion, since it is also applied to the posterior lobe-like appendages of the wing, in the latter insects. In the Lepidoptera, the shell-shaped scale is termed the "patagium", but this is entirely incorrect, since the true patagium, which is a lobe-like structure borne on the posterior portion of the pronotum, is often present in the same individual in which the scale in question is also clearly discernible. Latreille, 1822, terms the scales, "pterygodes". The designation epaulet (from the early French writers Chabrier, 1822, Audouin, 1840, etc.) or the designation tegula, is the preferable term to apply to the structure in question.

Pleurites.

Beneath the wing, at its base, are the basalar plates, or the anterior and posterior basalare, *aba* and *pba*. These are situated in front of the pleural alar fulcrum, which serves as a pivot for the wing in the movements of flight. Behind this fulcrum, and immediately below the wing are the subalar plates, or the anterior and posterior subalare *asa* and *psa*. All of these plates may be designated as alar-pleurites (from their intimate association with the wing in the movements of flight). Snodgrass, 1909b, terms them the paraptera, but this term is a synonym of tegulae.

The principal plate of the pleural region, is the eupleuron, composed of the sclerites *em*, *es*, and *lpl* (fig. 1) well illustrated by the earwig *Forficula*. In this plate, an infolding of the wall (i. e. an implex) with its external suture (the pleural suture), marks off a posterior region *em*, the epimeron. The sclerite immediately in front of the pleural suture, is the episternum, *es*. The formation of a second suture (in front of the episternum) marks off the sclerite *lpl*, or lateropleurite shown in its most characteristic form in the Dermaptera. As was stated above, the lateropleurite, episternum and epimeron together make up the eupleuron, or principal pleural plate, which was doubtless originally a simple undivided plate but later became secondarily marked off into the regions described above. The fusion product of this plate united with the sternum is usually designated as the pectus. The pleural plate (eupleuron) is usually connected with the sternal region by a precoxal bridge *prc* (precoxale) extending in front of the coxa, and also by a post-coxal bridge *poc* (postcoxale) extending behind the coxa. These "bridges" may occur as separate and distinct plates, not united with the pleural and sternal plates.

As was mentioned above, the pleural and sternal regions may become united to form one continuous region, the pectus. In this fusion

product, an anterior region *hyp* (hypopteron) may become secondarily marked off by the formation of a new suture. Audouin, 1820—1821, at first termed it the hypopteron. Later however, (Audouin, 1824 and 1832) he included it, together with the tegula, *tg*, under the designation parapteron, erroneously thinking that the two are homologous in different insects. Jordan, 1902, calls it the "peristernum". Hopkins, 1909, terms it the "preepisternum" — a term which Snodgrass, 1909b, at first accepted; but later (Snodgrass, 1910b) changed it to "prepectus", in the Hymenoptera. Enslin, 1912, calls it the "praesternum", in the sawflies.

An upper region *aes*, the anepisternum is sometimes marked off in the dorsal region of the true episternum *es*, in such insects as the Diptera, Neuroptera, and many Lepidoptera. It is frequently mistaken for the entire episternum. The episternum (or its homologue), however, always extends along the pleural suture (when this is present) from the top to the bottom of the pleural plate (i. e. from the wing fulcrum to the coxa), in all insects, and without exception. In the Diptera, the anepisternum is called the "mesopleura" by Osten-Sacken, 1884. The term mesopleura is always applied to the pleura i. e. both flancs) of the mesothorax, so that this term is hardly applicable to the sclerite *aes*. I have adopted Osten-Sacken's term "sternopleura" (slightly modified to sternopleurite), however, in referring to the fusion product of the lower portion of the episternum, etc., united with the sternum, in the Diptera.

In the Blattidae, the trochantin, *tn*, is a large triangular plate, from which a smaller plate *tnl*, the trochantinelle, is constricted off, in the prothoracic region. The smaller plate *tnl* is always mistaken for the entire trochantin, in such cases. In *Corydalis*, and other Neuroptera, the trochantin, *tn*, together with the small marginal region *ac* (fig. 1) and the lower portion of the episternum (cut off by the dotted line indicated in the figure as a continuation of the suture marking off the sclerite *ac*) all unite to form a compound sclerite *ptn* (the pleurotrochantin) or fusion product of the lower portion of the pleural region, with the trochantin. This sclerite was formerly termed the "katepisternal complex" (Crampton, 1909) but this designation is too cumbersome. The compound sclerite *ptn* is always mistaken for the trochantin *tn*, alone, but the trochantin itself never assumes this shape, nor does it extend into the sternal region in the way the sclerite in question does. Furthermore, despite the statement to the contrary by Snodgrass, 1909b, the trochantin never intervenes between the episternum and the coxa, for the episternum, or its homologue, always extends from the top to the bottom of the pleural plate, and in those

cases in which the trochantin appears to intervene between the episternum and coxa, the sclerite in question is not the true trochantin, but the trochantin fused with the lower portion of the pleuron.

The epimeron in such insects as *Mantispa* is clearly divided into an upper and lower region (fig. 1, *ptp* and *h*). In a previous publication (Crampton, 1908) I termed these subdivisions of the epimeron, the hyper- and hypoepimeron; but since these terms were criticized as being confusingly similar, I later changed them (Crampton, 1909) to ana- and kataepimeron. In the Diptera, a sclerite homologous with the region *ptp* was termed the "pteropleura" by Osten-Sacken, 1884. Since this term has received such widespread acceptance among systematists, it is preferable to retain it for the sclerite in question. The designation "pleura" however, refers to both of the pleura, or flanks. I have therefore slightly modified the term pteropleura to pteropleurite (pleurite means a sclerite of the pleuron) and would retain this designation for the sclerite *ptp*. For the lower division of the epimeron *hem*, the term hypoepimeron may be retained. Packard, 1882, applies the term infra-epimeron to the sclerite *hem*, in some cases, while in others (e. g. *Corydalis*) he applies the term infra-epimeron to the meron (posterior region of the coxa). The upper region of the epimeron, he terms the sur-epimeron.

In certain Odonata (Libellula, for example) there occurs behind the metathoracic epimeron, a distinct plate (the postpleurite, or "opisthopleurite") which is apparently a posterior sclerite of the epimeron. It may, however, be an abdominal sclerite closely associated with the thoracic region. I have not observed the homologue of this sclerite in other orders of insects.

The meron (fig. 1, *me*) is the posterior region of the coxa (*cx*) which is divided into an anterior region, the veracoxa (*vc*) and the meron just referred to. The meron is not a portion of the epimeron as Snodgrass, 1909b, maintains, but is a posterior portion of the coxa, which is but little distinguished from the remainder of the coxa in the Blattidae, while in the Neuroptera it becomes distinctly marked off from the remainder of the coxa, and in the Diptera, it becomes somewhat separated from the remainder of the coxa, and is more closely connected with the pleural region. In the lower Diptera (Tipulidae) it is clearly the posterior region of the coxa, but in the higher Diptera, it becomes fused with the lower portion of the epimeron, forming the meropleurite (i. e. *me* together with *h*, fig. 1). In the Diptera, it has been mistaken for the sternum, by practically everyone.

Sternites.

The term sternum includes the entire sternal region of the segment, and should not be applied (in the restricted sense) to any of the sternal subdivisions, or sternites, since such a course of procedure will invariably cause confusion. In such primitive insects as *Leuctra* and *Capnia* (Plecoptera) there are five well defined sternites, best developed in the prothorax, but partially united (although separated by sutures) in the other segments. These sternites are the presternite *is* (fig. 1); the basisternite, *bs*; the furcasternite, *fs* (bearing the internal furca); the postfurcasternite, *s*; and the spinasternite, *ss* (bearing the internal spina, or unpaired apophysis).

Since he thought that the four tergites described by him in some insects represent the tergal regions of four vestigeal segments composing each thoracic segment, MacLeay, 1830, considers that the sternum should therefore be divided into four regions, for which he proposed the terms "praesternum, sternum (in the restricted sense) sternellum and poststernum". These, he could not find in any true insect, but states that they are present in *Iulus* (a myriopod) and *Squilla* (a crustacean)! MacLeay's hypothesis that the four tergal subdivisions described by him (there are in reality only two distinct tergal plates, *ssl* and *psl*, fig. 1) represent four subsegments or annuli, is regarded as wholly absurd by every modern investigator, so that the four sternal subdivisions assumed by him (he never saw them, and therefore could not figure or describe them for insects) do not exist. Jardine, 1913, has consummated the reductio ad absurdum, by following MacLeay's principle to its logical conclusion and dividing the pleural region also into a "praepleura, pleura, pleurella, and postpleurella"!

MacLeay found his sternal subdivisions only in *Iulus* and *Squilla* (which he considered as insects), and therefore did not apply his terminology to the sternites of true insects. MacMurtrie, 1831, was the first to attempt to apply MacLeay's terminology to insects, and designated the pro-, meso-, and metasternum as the praesternum, sternum, and poststernum. The term sternellum, he simply disregarded. The next attempt to apply these terms to the sternites of insects was made by Meinert, 1867, who termed the sclerite *ss* (fig. 1), the praesternum; while he designated the fusion product of the sclerites *bs* and *fs*, as the sternum; and applied the term poststernum to the sternite *s*, in *Japyx*. Camerano, 1882, applies the term sternum to the sternite *bs*; and the term sternellum to the sternite *fs*, in *Sphodrus*. Comstock, 1902, applies the term sternellum to the sternum of the first abdominal segment, and to the posterior one of the two cervical sternites *cs* (which are detached portions of the first sternite); and

designates the fusion product of sternites *bs* and *fs* as the sternum, likewise including the anterior of the two cervical sternites *cs*, under this designation. Berlese, 1906—1909, applies the term sternellum to practically all of the sternites (and to the meron in addition) in different insects. Hopkins 1909, applies the terms presternum, sternum, sternellum, and poststernellum to four secondarily-marked-off regions in the fusion product of *bs* and *fs*, in *Dendroctonus*. Snodgrass, 1909b, applies the designation sternellum to the sternite *ss*, and usually terms the sternite *bs*, the sternum, while the sclerites which he designates as the presternum include the lateral and ventral intersegmentals, together with sclerites *lst* (or *lst* united with *lpl*) and the anterior portion of *bs*.

It would be possible to apply MacLeay's terms to the first four sternites *cs*, *is*, *bs*, and *fs* (fig. 1) or to the sternites *is*, *bs*, *fs*, and *ss*, this however, would merely add to the already sufficiently disconcerting confusion in applying these terms, so that it is preferable to discard them entirely (especially since the term sternum should not be applied to both the entire sternum, and one of its subdivisions as well) and apply purely descriptive terms to the sternites (which are more than four — the number postulated by MacLeay).

The two cervical sternites *cs* are either detached portions ("derivatives") of the presternite *is*, or owe their origin to the rubbing of the head upon the folds of the neck. They are present only in the cervical region. Only one is shown in the figure.

The presternite *is* is present as a distinct plate in front of all three segments of *Capnia* and *Leuctra* (Plecoptera), but is usually present in front of the prothorax alone in other insects, such as the Dermaptera, Embiidae, etc.

The basisternite *bs* (like the basisphenoid of the skull) forms the lower portion of the sternum, while its two wings, the laterosternite *lst* one on either side) extend upward into the pleural region, and may form detached plates, as in the Dermaptera. The plate *lpl* of the pleural region and *lst* of the sternal region become united in a single detached plate in the prothorax of the Blattidae, and these two sclerites usually unite in other insects, to form a pre-coxal bridge, connecting the sternal and pleural regions. A narrow posterior marginal region *ac*, the antecoxale, is marked off in the posterior region of the plate *lst* (in the metathorax of the earwig *Echinosoma*) or in the pre-coxal bridge, in the prothorax of the Blattidae.

The furcasternite *fs* always bears the furca. It is called the antecoxal piece in Coleoptera. The postfurcasternite, *s* is a well developed, detached plate in all three thoracic segments of such insects as *Capnia*; but unites with the other sternites, in higher insects.

The spinasternite *ss* bears the spina, or unpaired internal apophysis. It is present in many Orthoptera, in the prothoracic region, but is usually small and indistinct, and in some insects, fuses with the sternite in front of it — in others, it fuses with the sternite behind it (e. g. in *Corydalis*).

There is considerable doubt as to whether the spinasternite is the first sternite of the segment following it, or the last sternite of the one in front of it, since it is united with the segment behind it, in the mesothorax of such insects as *Corydalis*; and even in the Orthoptera, it is much nearer to the segment behind it than to the one in front. The musculature would admit of either interpretation, but since it is usually attributed to the segment in front it will be treated as the posterior most sternite in the present paper. The terminology here applied to the sternites, being purely descriptive, would apply equally well in either case.

Bibliography.

Audouin, 1820, L'anatomie comparative des parties solides des insectes. Annal. general. des Sci. phys. 1820. Tome 7. p. 396—406.

——, 1824, Recherches anatomiques sur le thorax des animaux articules et celui des insectes hexapodes en particulier. Ann. des Sci. naturelles. 1824. Tome 1. p. 97—135. Rapport par Cuvier, 1821.

——, 1832, Exposition de l'anatomie comparée du thorax dans les insectes ailés, par W. S. MacLeay, accompagnée de notes par M. Audouin. Ann. des. Sci. nat. 1832. Tome 25. p. 95—151.

——, 1840—1842, Histoire des insectes nuisibles à la Vigne et particulièrement de la Pyrale. Paris 1842.

Berlese, 1906—1909, Gli Insetti. Milano 1909.

Camerano, 1882, Anatomia degli Insetti. Roma 1882.

Chabrier, 1820—1822, Essai sur le vol des insectes Mem. Mus. hist. nat. Tome 6. p. 410—476; Tome 7. p. 297—372; Tome 8. p. 47—99, and p. 349—403. 1820 to 1822.

Comstock and Kochi, 1902, The Skeleton of the Head of Insects. Amer. Nat. Vol. 36. 1902. p. 13—45.

Crampton, 1908, Ein Beitrag zur Homologie der Thoracalsclerite der Insekten. Diss. Berlin 1908.

——, 1909, A Contribution to the Comparative Morphology of the Thoracic Sclerites of Insects. Proc. Acad. Nat. Sciences, Philadelphia 1909. p. 3—54.

Emery, 1900, Intorno al Torace delle Formiche. Bull. Soc. Ent. Ital. Vol. 32. p. 103—119.

Enslin, 1912, Die Tenthredinoidea Mitteleuropas. Deutsche Ent. Zeit. Jahrg. 1912. Beiheft. p. 1—98.

Groeschel, 1911, Die Flugorgane der Hornis. Arch. für Naturg. 1911. 1. Bd. 1. Suppl.-Heft. S. 42—62.

Hopkins, 1909, The Genus Dendroctonus. U. S. Dept. Agr. Technical Ser. No. 17. Part 1. 1909.

Jardine, 1913, Dictionary of Entomology. Kent 1913.

Jordan, 1902, Das Mesosternit der Tagfalter. Verhandlungen d. V. Internat. Zool. Kongresses, Berlin 1902. p. 816—829.

Jurine, 1820, Observations sur les ailes des Hyménoptères Mem. reale Accad. Sci. Torino. Tome 24. 1820. p. 177—214.

Latreille, 1820—1822, Des rapports généraux de l'organization extérieure des

animaux invertébrés articulés. Mém. Mus. Hist. Nat. 1820. Tome 6. p. 116—144. Also Tome 7.
MacLeay, 1830, Explanation of the Comparative Anatomy of the Thorax of Winged Insects. Zool. Journal. Vol. 5. 1830. p. 145—179.
Marlatt, 1896, Revision of the Nematinae of North America. Bull. 3. Technical Ser. U. S. Dep. Agr. Bur. Ent.
McMurtrie, 1831, The Animal Kingdom (Translation of Cuvier's Regne Animal) New York 1831.
Meinert, 1867, On the Campodea. Ann. and Mag. Nat. Hist. London 1867. 3. Ser. Vol. 20.
Osten-Sacken, 1884, An Essay on Comparative Chaetotaxy. Trans. Ent. Soc. London 1884. Part 4. p. 497—517.
Packard, 1882, Chapter XI of Third Report of the U. S. Entomological Commision. 1880—1882. p. 286—347.
Smith, 1906, Glossary of Entomology. Brooklyn 1906.
Snodgrass, 1908, A Comparative Study of the Thorax in Orthoptera, Euplexoptera, and Coleoptera. Proc. Ent. Soc. Washington. Vol. 9. 1908. p. 95 bis 108.
——, 1909a, The Thoracic Tergum of Insects. Ent. News. 1909. p. 97—104.
——, 1909b, The Thorax of Insects and the Articulation of the Wings. Proc. U. S. Nat. Museum. Vol. 36. 1909. p. 511—595.
——, 1910a, The Anatomy of the Honey Bee. Bull. 18. Technical series. U. S. Dpt. Agr. Bur. Ent. 1910.
——, 1910b, The Thorax of the Hymenoptera. Proc. U. S. Nat. Museum. Vol. 39. 1910. p. 37—91.
Verhoeff, 1903, Beiträge zur vergleichenden Morphologie des Thorax der Insekten mit Berücksichtigung der Chilopoden. Nova Acta. Abh. K. L. C. Deutsch. Akad. Naturf. Bd. LXXXI. 1903. 63—109.
Woodworth, 1906, The Wing-veins of Insects. Univ. California Agr. Exper. Station Pub. Technical Bull. Entomol. Vol. 1. No. 1. 1906.

3. Bemerkungen zur Entwicklung von Eimeria subepithelialis.

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(Mit 12 Figuren.)

eingeg. 9. Januar 1914.

Ein seuchenhaftes Auftreten der Coccidiose unter der Karpfenbrut eines mir bekannten Teichbesitzers gab das Material zu meinen folgenden Untersuchungen. Die Krankheit soll, so lautete der Bericht, einen ganz akuten Verlauf nehmen und große Opfer fordern. Die mir eingesandten Fischchen waren verschieden alt, 14 Tage bis etwa 4 - 5 Wochen. Alle machten schon bei ihrer Ankunft einen recht hinfälligen Eindruck, waren sehr matt, zeigten stellenweise schon Pilzauflagerungen und verendeten in den Hältern auch sämtlich im Laufe weniger Tage.

Bei Eröffnung der Körperhöhle zeigte sich der Darm stellenweise entzündet; durch die Muskulatur schimmerten vereinzelt graugelbliche, kleinste Knötchen hindurch. In Abstrichen von der Darmwandung waren massenhaft Entwicklungsformen der oben genannten *Eimeria*-Form zu finden.