of resemblance of children to fathers rests more on mathematical ideas than on biological indications, to judge from Thompson's account of it. To show that later children resemble their fathers more than earlier children would not demonstrate a cumulative paternal influence, but might only mean that children of older parents have less tendency to vary from parental characters than children of young parents. It would still be necessary to show that the paternal resemblances of the later children increase more than their maternal resemblances.

O. F. COOK

WASHINGTON,
April 30, 1909

SCIENTIFIC BOOKS

A Comparative Study of the Thorax in Orthoptera, Euplexoptera and Coleoptera. By R. E. SNODGRASS. *Proc. Ent. Soc. Washington,* IX., 1908, pp. 95–108, pls. II.–V.

The Thoracic Tergum of Insects. By R. E. SNODGRASS. *Ent. News,* March, 1909, pp. 97–104, pl. VI.

The Thorax of Insects and the Articulation of the Wings. B. R. E. SNODGRASS, of the Bureau of Entomology, U. S. Department of Agriculture. No. 1687—Proceedings U. S. National Museum, Vol. XXXVI., pp. 511–595, with plates 40–69. Published June 18, 1909.

The series of memoirs, under the above titles, constitutes a very valuable addition to the literature of insect structure. The last paper contains the detailed evidence for the theories presented by the other two and is really considerably broader than the title indicates, including an elaborate discussion of the segmentation of the head and abdomen and is not limited to a study of adult structure.

The diagrams (Figs. 1–6) present in an extremely satisfactory manner the author's views on the structure of the thorax, and the "glossary and synonymy" (on pp. 570–583) will prove more than ordinarily useful to subsequent students of this subject. Many will agree heartily with the protest against the tendency to explain all structural differentiation of a segment by the supposition of a multiple origin. It is pointed out that if segments have been lost they have been suppressed and not fused and are not represented by the present subdivisions of the segments.

There may be less assent to the idea of separating the labial segment from the head, there would be more reason for considering the prothorax as not forming part of the thorax. Much is added to our knowledge of the detail of the sternal and pleural structures, but nothing added to the interpretation of their significance beyond the accumulation of evidence against their supposed double origin and in favor of the single origin urged by myself several years ago[1] and the elevation of the occasionally partially chitinized articular membrane to the position of a component part of the segment under the names of the presternum and preepisternum.

In reference to the notum we find the most radical views. This region is conceived of as consisting of two parts, one the original chitinized portion of the segment, the other a new sclerite resulting from the chitinization of the articular membrane. This last portion is identified as the postscutellum of Audouin, the division between other three regions of the notum are supposed to be of relatively recent origin and not to be homologous through the group, since they do not correspond with a system of internal ridges which are considered as comparable in all insects.

It is probable that in some groups many authors have made mistakes in properly homologizing the various parts of the dorsum, but there has not yet been offered enough evidence to cause us to overturn at once the older nomenclature.

The scutum is the piece bearing the wing processes. Exactly what its anterior border is may be a question for discussion. Posteriorly it is probably bounded by the "V-shaped ridge," but here again we may have an unsettled question. The piece behind the scutum is the scutellum. There is no difficulty in most cases in recognizing it, but its exact boundary may again be an unanswered ques-

[1] "The Wing Veins of Insects," Univ. of Calif. Publications, Entomology, Vol. I.

tion. It is to be regretted that the author did not bring out the homology of these two great regions of the notum and devote his energies to the determination of the real boundaries of these regions.

The interpretation of the origin of the post scutellum or pseudonotum, as he calls it, was suggested by myself in the paper previously referred to, though I can not agree in considering this region belonging more to the segment in front than to the segment behind, particularly when the phragma is considered as part of this interpolated sclerite.

The great dorsal muscle of flight for which the phragma was developed is probably only a dorsal intersegmental muscle. These extend from the anterior edge of one segment to the corresponding part of the next. The anterior phragma is mesoprescutal, the posterior is a part of the first abdominal segment. The hymenoptera appear to be an exception in regard to the position of the first abdominal segment, only because of the great constriction between the first and second segment.

It may be impossible on anatomical grounds to locate the division between segments after the articular membrane has become wholly chitinized. The phragma may be, as this author says, a "chitinization of the infolded intersegmental membrane," but if so, why is not the deepest point of the fold the point of demarkation between the segments?

A more reasonable position would seem to be that the infolding for the attachment of intersegmental muscles marks the posterior boundary of the prescutum that the phragma belongs therefore entirely to the following segment and that with the completion of the chitinization of the articular membrane, the division is lost somewhere immediately anterior to the phragma.

The region designated by this author as pseudonotum developed as a chitinization of the articular membrane is probably therefore made up of two elements, one of which is continuous with the prescutum of the following segment.

The articulation of the wing has been studied in much detail, but scarcely anything is added to the work of Amans except the application of the Comstock-Needham nomenclature to the veins. The veins are said to be "connected or associated in a very definite and constant manner with the sclerites of the wing base," but speaking of the chief vein in the wing he says: "The base of the radius is nearly always more or less closely fused with the base of the subcosta but it is clearly connected also in a great many cases with the anterior end of the second auxiliary. In other examples its head is only contiguous to the third auxiliary." This does not seem to be very definite nor constant.

The study of the articulation throws but little light on the question of the homology of the veins because of the fact that in all orders except Odonata and Ephemerida, the basal connection of the veins has been disturbed to enable the wing to fold back against the body. Indeed the basal connections of the veins are very unreliable and are not depended on by any one in the determination of the homologies of the veins.

The presenting of theories is condemned by the author in numerous places and this article is offered as an accumulation of facts and conclusions, but it is very difficult to see the distinction. Theories in truth constitute the whole of science. Facts are nothing unless they mean something, and our interpretation of that meaning is what we really present. A drawing is at best a crude representation of the object and its only use is to represent our theory of what we see. The present paper contains over two hundred excellent drawings with very full explanations which will enable subsequent students to comprehend exactly what the interpretation of the structures were and I feel sure that in most particulars they will concur with his conclusions.

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A Short Handbook of Oil Analysis. By AUGUSTUS H. GILL, S.B., Ph.D. Fifth Edition. Philadelphia, Lippincott & Co. $1.50.

A book on chemical analysis which has five editions in twelve years is very nearly beyond criticism; fault finding is disapproved in advance, and praise is but gilding the re-