Book Review

ROHDENDORF, B. B. 1974. The Historical Development of Diptera (English Edition). University of Alberta Press, Edmonton. xv + 360 pp. 85 figures. Size 9 inches by 6 inches, cloth covers. Price: $13.50 Canadian, postage free. (Translation of Russian Edition published by "Nauka" as Volume 100, Transactions of the Institute of Paleontology, Academy of Sciences of the USSR, Moscow, 1964).

I find it difficult to review this work as I disagree fundamentally with some of the author's methods and principles. Rohdendorf is clearly a representative of those orthodox Marxists who believe in historical explanations in the form of the dialectical triad (thesis, antithesis, synthesis). In Rohdendorf's presentation the theses and antitheses are called "conflicts" and the syntheses "solutions". Following the orthodox dialectical schema, evolutionary progress is seen as the successive solution of conflicts each produced by the solution of some previous conflict. These methodological concepts are presented in Part IV of Rohdendorf's book as if they were somehow conclusions drawn from his studies. In fact they are preconceptions through which he attempts to interpret his data. Dialectics is not an empirical theory, but has its roots in idealist philosophies (notably that of Hegel) utterly opposed to empirical science. I refer the reader to an excellent review of this subject by Karl Popper (1940. What is dialectic? Mind 49: 403-426).

This is not to say that Rohdendorf's explanations are all valueless, and without interest. There are undoubtedly points of importance in his analysis. But by his rigid adherence to the dialectical pattern of explanation, he denies himself the possibility of subsuming evolutionary changes under covering laws in accordance with the generally accepted concept of scientific explanation. Let us consider one example, Rohdendorf's first "concrete example of internal conflicts" (p. 319). Here we are offered an explanation of the evolution of apodous (legless) larvae in Diptera, in the form of a solution to the following conflict:

A. Need for a solid substrate for locomotion of the larva, provided by three pairs of walking legs.	B. Need for nutrition in a moist, semiliquid substrate, forming comparatively large masses.

Obviously there is some truth in this. An insect with thoracic walking legs which penetrated a mass of viscous substrate would find its legs an obstacle, not an aid, to locomotion. Therefore it is reasonable to hypothesize that leglessness was evolved in one of the ancestors of the Diptera whose larvae came to feed in a viscous substrate, such as wet soil or decomposing organic matter of some kind. However, the covering laws under which this morphological change can be subsumed must surely involve the mechanics of locomotion through a viscous medium, which Rohdendorf does not discuss. Moreover, it makes little sense to talk of a conflict between locomotion and nutrition in the larval stages of holometabolous insects, since their need for locomotion is largely determined by, not in conflict with, their need for food and shelter. But the invalidity of the supposed conflict is not the most important point. What is more serious, and applies even in those examples where the stated conflicts seem valid, is that Rohdendorf's concern to discover a "conflict" has diverted his attention from the possibility of genuine nomological explanation.

Throughout his book Rohdendorf emphasizes the need for functional and ecological explanations of evolutionary change. This emphasis seems to me well justified. But I think we will make more progress in providing such explanations if our thinking is not rigidly constrained by the dialectical schema.

Now to more specific matters. Part I of Rohdendorf's book deals with the characterization and classification of the Diptera. He rejects the conventional suborders Nematocera, Brachycera and Cyclorrhapha, but makes his primary division into the suborders Archidiptera

(Nymphomyiidae only in the Recent fauna) and Eudiptera (all the rest). The first name is in error (Archaeodiptera conveys the intended meaning), as has already been pointed out by Cutten and Kevan (1970. The Nymphomyiidae [Diptera], with special reference to *Palaeodipteron walkeri* Ide and its larva in Quebec, and a description of a new genus and species from India. Can. J. Zool. 48: 1-24). The Eudiptera are then divided into 12 infraorders (Deuterophlebiomorpha, Blephariceromorpha, Tipulomorpha, Bibionomorpha, Asilomorpha, Musidoromorpha, Phoromorpha, Termitoxeniomorpha, Myiomorpha, Braulomorpha, Nycteribiomorpha and Streblomorpha).

The validity of Rohdendorf's separation of Nymphomyiidae from the rest of the Diptera remains unsettled. Cutten and Kevan (loc. cit.) are inclined to support Rohdendorf's view, but other authors have advocated alternatives. A cytological study might well settle this dispute, since White's (1949. Cytological evidence on the phylogeny and classification of the Diptera. Evolution 3: 252-261) work has shown that the major subgroups of Diptera have quite different genetic systems. (Rohdendorf's failure to consider White's work was a serious omission).

Rohdendorf's subdivision of the Eudiptera is highly arbitrary and has found no acceptance outside the Soviet Union. It is evident from his phylogeny diagrams (Figs. 81-85) that many of his group concepts are not intended to represent monophyletic groups in the sense of phylogenetic (Hennigian) systematics. Rohdendorf believes in the evolution of new high-ranking groups by rapid "qualitative transformation", and sees the gaps between existing groups as evidence of such transformations. Consequently he identifies systematic groups with "biotypes . . . associated with definite conditions of existence, which are reflected in similarities of structure, function and ontogentical development" (p. 17). Rohdendorf's nomenclatural scheme is thus not intended to represent the branching pattern of phylogeny, but rather constitutes a typological classification superimposed on phylogeny. It is easy to misunderstand his views on phylogenetic relationships, as these are not consistently represented in the classification and there is an inherent ambiguity in his use of "relationship" and similar terms in discussion (sometimes typological, sometimes phylogenetic relationship is meant). Now that the complete text of this work is available to me, I find that both Hennig and myself have succeeded in misunderstanding certain points on this account. The only monophyletic groups among Rohdendorf's infraorders are the Deuterophlebiomorpha, Blephariceromorpha, Musidoromorpha, Termitoxeniomorpha, Braulomorpha and Streblomorpha. All these are small, highly specialized groups usually given family, or even lower, rank by Western authors. We are told that the first four are "relicts" (a term used liberally in Rohdendorf's evolutionary discussions), but not offered the slightest evidence that they were ever more diverse or more widely distributed than at present.

A detailed commentary on Rohdendorf's classification would take up much space, and is scarcely necessary since such commentary has already been published. Rohdendorf's infraorder and superfamily classification of the Eudiptera has been discussed in some detail by Hennig (1968. Kritische Bemerkungen über den Bau der Flügelwurzel bei den Dipteren und die Frage nach der Monophylie der Nematocera. Stuttg. Beitr. Naturk. no. 193. 23 pp.). His treatment of the Cyclorrhapha has been discussed in my recent book (Griffiths, G. C. D. 1972. The phylogenetic classification of Diptera Cyclorrhapha, with special reference to the structure of the male postabdomen. Junk, The Hague. 340 pp.). Neither of us were of the opinion that the changes proposed by Rohdendorf are improvements from the viewpoint of phylogenetic systematics.

Part II of Rohdendorf's work is entitled Diptera of the Geological Past. Most of this Part is devoted to descriptions and discussion of the Upper Triassic Issyk-kul and Middle Jurassic Karatau faunas of Central Asia. The work of Rohdendorf and his collaborators (the information in the present work has since been supplemented by a series of further publications) remains

the main primary source of information on Mesozoic Diptera, and should be studied by all interested in the history of the Diptera. Again I will not attempt to give a detailed commentary, but refer the reader to the discussion in Hennig's recent book on fossil insects (1969. Die Stammesgeschichte der Insekten. Waldemar Kramer, Frankfurt am Main. 436 pp.). However, certain major points of criticism do deserve mention here.

Like Hennig, I am not satisfied that the wing fragments referred by Rohdendorf to the "Archidiptera" are Diptera at all. More complete fossils are needed for the relationships of these insects to be reliably assessed. It seems to me quite unwarranted to base elaborate evolutionary hypotheses on the available fragments, as Rohdendorf does later (p. 289).

I also share Hennig's opinion that there must be inaccuracies in certain of the wing figures, which show cross-veins and vein stubs in positions where these cannot be found in any existing Diptera. For instance, if we consider the Triassic fossils ascribed to the Tipulidea, there is only one (*Architipula radiata* Rohd.) whose wing venation is entirely convincing. Rohdendorf was doubtless faced with technical problems in distinguishing impressions made by wing veins from other impressions in the rock. Such problems may not be entirely soluble with present-day paleontological techniques. But what is more difficult to understand is that Rohdendorf seems to take little account of these problems and frequently uses doubtful features as defining characters for his fossil taxa. For this reason I fear that future workers without access to the original material will find it difficult to interpret many of these taxa.

If Rohdendorf reads this review, his reaction will likely be that I am trying to "abolish the dialectic" (a shocking and unthinkable thing to the orthodox Marxist). I openly admit that this is my intention. The privileged position of dialectics in Marxist countries (due to the acceptance of Hegelian dialectics by Marx) is a constant threat to the progress of the empirical sciences there. Most Soviet scientists, while paying lip service to dialectics, have the good sense not to allow it to influence their practical work. Rohdendorf is an exception. He really tries to implement the official party line. The results serve, in my opinion, merely to show that dialectics has nothing to contribute to empirical science except an empty play of words.

In view of these weighty criticisms, do I think it was worthwhile publishing an English translation of this work? Yes, marginally. Rohdendorf's work is the main source of information on Mesozoic Diptera, and buried in the dialectical verbiage are occasional points of genuine interest and importance. However, only those with extensive knowledge of the Diptera will be able to separate the grain from the chaff. Keep this book away from inexperienced students; it will only confuse them.

The University of Alberta Press may be complimented for an attractive production, printed on much better paper than the Russian original. Printing errors are few, and mostly unimportant. But note that in the third paragraph on page 111, "Heleomyzidea" should replace "Heleomyzidae" in the first line, and "Helcomyzinae" should replace "Heleomyzinae" in the last line.

Graham C. D. Griffiths
Department of Entomology
University of Alberta
Edmonton, Alberta T6G 2E3