

SEPARATE
OF A PAPER PUBLISHED BY
THE INTERNATIONAL TRUST FOR ZOOLOGICAL NOMENCLATURE
ON BEHALF OF
THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

This paper contains an application relating to a question of zoological nomenclature which has been submitted to the International Commission on Zoological Nomenclature for decision. As a preliminary, this paper has been published in the "Bulletin of Zoological Nomenclature". The volume in which this paper was so published and the date of publication are shown at the foot of the first page of the paper.

2. The object of publishing applications in the "Bulletin of Zoological Nomenclature" is to provide an opportunity to interested specialists to submit comments to the Commission on the action recommended in the applications so published. For this purpose an interval of six months from the date of publication is allowed to elapse before the International Commission starts to vote on any given application.

3. One of the principal objects of the International Trust for Zoological Nomenclature in providing authors with separates (off-prints) of applications published in the "Bulletin" is to secure a rapid and wide distribution of those applications among interested specialists, in order to provide to those specialists an opportunity of commenting upon the applications in question before a decision is reached by the International Commission.

4. Recipients of separates of papers published in the "Bulletin" are therefore particularly requested to furnish their comments on the action proposed as soon as possible to the Assistant Secretary, the International Commission on Zoological Nomenclature c/o British Museum (Natural History), Cromwell Road, London, S.W.7, England.

DROSOPHILA CARINATA GRIMSHAW, 1901 (INSECTA, DIPTERA):
PROPOSED SUPPRESSION UNDER THE PLENARY POWERS IN
ORDER TO PRESERVE *DROSOPHILA MERCATORUM*
PATTERSON AND WHEELER, 1942. Z.N.(S.) 2035

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The purpose of this appeal is to forestall an impending confusion in the literature in the matter of the name of an extensively-studied species of *Drosophila*. To this end, the undersigned recommend that the plenary powers of the Commission be used to suppress the name *Drosophila carinata* Grimshaw, 1901, and that it be placed on the Official Index of Rejected and Invalid Specific Names in Zoology. The reasons for requesting this action are enumerated briefly below; this is followed by a detailed discussion and bibliography.

The basic facts

1. The specific name *D. carinata* was published by Grimshaw (1901) with an accompanying description. Type material consists of a single teneral female specimen collected in Kona, Island of Hawaii, in 1892.

2. Subsequent to this, this name was not used in the literature for 64 years. Hardy (1965) reports on his examination of the type specimen. He believed it to be conspecific with *Drosophila mercatorum* Patterson and Wheeler, 1942.

3. The name *D. mercatorum* was published at a time when there was a great intensification of work on *Drosophila*. The name has subsequently been used in 52 publications and it actually appears in the titles of 19 of these papers.

4. The name *mercatorum* has also been used to refer not only to a species but to an important subgroup containing three species of the *repleta* group of *Drosophila*. Although subgroup designations are informal, loss of usage of this designation would create confusion in referring to these flies.

5. Within *D. mercatorum*, two subspecies of very wide geographical distribution have been described. Loss of the name would result in confusion of nomenclature at this level also.

6. The species concerned belongs to a very difficult and interesting group of cryptic species, the *repleta* group of *Drosophila*. Because of the wide biological interest generated by this situation, much research has been done with genetic techniques to clarify the status of these species. This has resulted in a large literature.

7. In 1962, it was shown that the small amount of facultative parthenogenesis in this species could be built into a major mode of reproduction by artificial selection. This has led to a series of papers and the matter continues to be actively studied at the present time.

8. Because of the fact that no sure way exists to separate pinned specimens of females of the two subspecies of *D. mercatorum* from each other or from the full species, *D. repleta* or *D. paranaensis*, considerable question remains as to

the specific identity of the type specimen of *D. carinata*. We feel that it is unlikely that this situation can be clarified by further research on this specimen.

Details of the case

The *repleta* group of the genus *Drosophila*, subgenus *Drosophila* consists of more than 100 species which evolved in American deserts; many breed on or have an ecological relationship to various cacti (Patterson and Stone 1952). Wasserman (1963) has summarized data on 46 species; among them are some of the most remarkable cases of cryptic species known. These have been uncovered by a long series of hybridization, genetic and chromosomal studies pioneered by Patterson and Stone and their colleagues at the University of Texas in the 1940's and continuing for the past 30 years.

The extraordinary case of the *mercatorum* subgroup has been documented in an extensive series of papers beginning in the 1940's with work in Brazil (DeBarros 1946, 1949a, b, c, 1950; Dreyfus 1948, 1949, 1957; Dreyfus and DeBarros 1947, 1948, 1949; Pereira and Dreyfus 1946) and culminated in the definitive papers of Wasserman (1954, 1960, 1962, 1963; Wasserman and Wilson 1957). The species name *mercatorum* has also been employed as a subgroup designation; it appears in approximately nineteen titles. In some cases, although the name is not in the title, a large portion of the paper is given over to a discussion of this species, its subspecies and its sibling species (e.g. Wharton 1944).

Briefly, the situation is as follows. Despite past confusion because of the cryptic nature of the species and subspecies, four entities are now recognised in the subgroup: (1) *D. mercatorum mercatorum* Patterson and Wheeler, 1942; type from Santa Barbara, California. This was recognised as the type subspecies by Patterson and Stone (1952). This subspecies is found in the mountains from Chile north to California. It has been collected in Rochester, New York and is abundant in Hawaii. This subspecies has many remarkable characteristics. As Carson (1956) has pointed out, it seems to be on the way towards the evolution of an invasive cosmopolitan habit. Furthermore, this subspecies has been used recently for an extended laboratory study of selection for parthenogenesis and the study of the origin of sexual isolation (Carson 1962, 1965, 1967a; Carson, Wei and Niederkorn 1969; Carson and Synder 1972; Doerr 1967, Henslee 1956, Wei 1968; Ikeda 1971, 1972). This work is in active progress at the present time. More than ten visible mutants exist; these and a number of parthenogenetic and wild stocks have been listed annually in *Drosophila* Information Service since about 1960. These references are not included in the bibliography. The species is a superb laboratory organism. The strong differences in its population structure from those found in *D. pseudoobscura*, *D. melanogaster* or *D. robusta* and the existence of parthenogenesis seem to assure that it will continue to be an important organism in future genetic research.

(2) *D. mercatorum pararepleta* was originally described as *D. pararepleta* by Dobzhansky and Pavan (1943). Following Wharton's (1944) studies, it was recognized as a subspecies of *D. mercatorum*. *D. m. pararepleta* is a chromosomally highly polymorphic subspecies found in the tropical lowlands from southern Brazil to Colombia. It crosses easily with the much more widespread,

essentially monomorphic subspecies *D. m. mercatorum*, producing fertile offspring.

(3) DeBarros (1950) described *D. paranaensis* from Brazil. Dissection of the penis of the males (Wasserman, 1962) is the only satisfactory way known to separate this species morphologically from either subspecies of *D. mercatorum*. Wasserman (1962) shows that *D. paranaensis* is widespread in tropical America as far north as Mexico. Hybrids with *D. mercatorum* are partially inviable and wholly sterile in both sexes.

(4) Carson (1967b) found that the extraordinary *Drosophila* parasite of land crabs in the West Indies, *carcinophila* Wheeler also belongs to the *mercatorum* subgroup: it is chromosomally more primitive than the other two species. This has led to further great biological interest in the *mercatorum* subgroup.

The difficulties posed by routine taxonomic treatment of the *repleta* group in general and these species in particular are illustrated in microcosm by the situation in the Hawaiian islands. Three species of the *repleta* group, *D. hydei* Sturtevant, *D. repleta* Wollaston and the subject of this appeal, *D. mercatorum* Patterson and Wheeler are known from Hawaii (Hardy 1965). *D. hydei* is fairly easy to distinguish morphologically. The critical problem involves the great similarity of *D. mercatorum* and *D. repleta*. The former usually keys to *D. repleta* and females of these two species and of *D. paranaensis* DeBarros are virtually indistinguishable. Hardy (1965: 204) discovered the apparent synonymy which has prompted this appeal. Examination of the type of *D. carinata* Grimshaw (a teneral female specimen) in the British Museum led him to conclude that it was conspecific with *D. mercatorum* Patterson and Wheeler, 1942. In discussing the situation, however, he states: "This species is closely related to *D. repleta* Wollaston and I find no really satisfactory morphological characters for separating the Hawaiian specimens". There follows a paragraph detailing his studies but he nevertheless concludes that the specimen is not *D. repleta*.

The difficulties described by Hardy with the Hawaiian specimens have been widely encountered by all workers in the *repleta* group. The identification by morphological means of females, either in pinned or living condition, remains an essentially unsolved taxonomic problem. If offspring can be obtained from a female, the species of the mother can ordinarily be determined by the characteristics of her sons. Lacking this possibility, however, a single pinned female from Hawaii might be *D. repleta*, *D. mercatorum* (of either subspecies) *D. paranaensis* or, indeed a previously undescribed species.

Even if future studies on the type specimen of *D. carinata* were to prove it to be synonymous with *D. mercatorum*, we appeal for suppression of the name. The grounds are that a complicated literature of over 50 titles would be thrown into confusion, as the name is employed for a subspecies, a species and a species subgroup. This literature is international in scope and has largely been devoted to the clarification of this extraordinarily complex and challenging biological situation. Action by the Commission would appear to be justified under the International Rules of Zoological Nomenclature; especially in view of the text of Article 79(b); Suppression of unused senior synonyms. Revisions in this

Article were ratified by the 17th International Congress of Zoology in September, 1972 (see Corliss, J. O. 1972 *Science* 178 : 1120).

Stocks of *D. mercatorum* are now in use at the University of Minnesota (Carolyn Doerr), the University of Chicago at Chicago Circle (Irene Wei), the University of Michigan (Alan Templeton and C. F. Sing), the University of Hawaii (H. L. Carson) and Tokyo Metropolitan University (H. Ikeda). Active research programmes are under way in all of these laboratories.

The International Commission is therefore requested:

- (1) to use its plenary powers to suppress the specific name *carinata* Grimshaw, 1901, as published in the binomen *Drosophila carinata*, for the purposes of the Law of Priority but not for those of the Law of Homonymy;
- (2) to place the specific name suppressed in (1) above on the Official Index of Rejected and Invalid Specific Names in Zoology.

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