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gested by WOLFE (1988), who proposes a unification of Methlini and *Hydrovatus,* on the basis of some morphological similarities between the two taxa. The status and composition of the Hydrovatini are thus at present partly open.

Since SHARP'S (1882a) monograph of the Dytiscidae, no work dealing with all recognized *Hydrovatus* species has been published.

Regionally delimited works of special importance are those of RÉGIMBART (1895b), GUIGNOT (1945a, 1959a) and OMER-COOPER (1957, 1963, 1965) dealing with Africa and Madagascar, FRANCISCOLO (1979) and ZAITZEV (1972) dealing with Europe and the Palearctis, RÉGIMBART (1899b) and VAZIRANI (1970b) dealing with the Oriental region, WATTS (1978) dealing with Australia and finally YOUNG (1956, 1963), who discussed the situation in America. Subgrouping of the genus is in the present work reviewed on p. 76.

My over-all aims with the present revision are:

a) To provide a complete taxonomic survey of *Hydrovatus* with diagnoses and descriptions of all recognized taxa and keys for their determination (adults).
b) To provide a classification of Hydrovatini on the basis of a comparative character analysis, including an evaluation of morphological features met with in adults of Hydrovatini and a number of other hydradephagan groups.

2. Material and methods

The study material, which consists of about 11100 adult specimens, comes from a number of institutions and private collections. These are referred to in the text by the following abbreviations:

AMS	– Albany Museum, Grahamstown, South Africa
AMSA	– Australian Museum, Sydney, Australia
ANIC	– Australian National Insect Collection, Canberra, Australia
ASC	– Academia Sinica, Beijing, China
BBM	– Bishop Museum, Honolulu, USA
BNM	– Nasionale Museum, Bloemfontein, South Africa
BMNH	– British Museum (Natural History), London, UK
CAS	– California Academy of Sciences, San Francisco, USA
CMNH	– Carnegie Museum, Pittsburg, USA
coll. Balke & Hendrich	– Berlin, Germany
coll. Bilardo	– Varese, Italy
coll. Brancucci	– Basle, Switzerland
coll. Foster	– Ayr, Scotland
coll. Nakane	– Chiba-shi, Japan
coll. Nilsson	– Umeå, Sweden

coll. Palm	– Lund, Sweden
coll. Pederzani	– Ravenna, Italy
coll. Persson	– Landskrona, Sweden
coll. Pitzke & Widdig	– Philipps University (Zool. dept.), Marburg, Germany
coll. Rocchi	– Florence, Italy
coll. Smith	– Natural Resources Institute, Kent, UK
coll. Vondel	– Hendrik Ido Ambacht, Netherlands
coll. Wewalka	– Vienna, Austria
coll. Weyrich	– Universitt des Saarlandes, Saarbrcken, Germany
coll. Young	– Bloomington, Indiana, USA
GNM	– Göteborgs Naturhistoriska Museum, Sweden
IFAN	– Institut Fondamental d'Afrique Noire, Dakar, Senegal
ISN	– Institut Royal des Sciences Naturelles, Brussels, Belgium
LUZ	– Zoologiska Museet, Lund, Sweden
MAC	– Musé Royal de l'Afrique Centrale, Tervuren, Belgium
MCG	– Museo Civico di Storia Naturalia "Giacomo Doria", Genoa, Italy
MCM	– Museo Civico di Storia Naturale, Milan, Italy
MCN	– Museo Nacional de Ciencias Naturales, Madrid, Spain
MNB	– Museum für Naturkunde der Humboldt Universität, Berlin, Germany
MNHN	– Museum National d'Histoire Naturelle, Paris, France
MNS	– Staatliches Museum für Naturkunde, Stuttgart, Germany
mus. Frey	– Tutzing, Germany
MZF	– Museo Zoologica della Specola, Florence, Italy
MZH	– Zoological Museum, Helsingfors, Finland
NMW	– Naturhistorisches Museum, Vienna, Austria
OLL	– Oberösterreichisches Landesmuseum, Linz, Austria
PUI	– Purdue University, W. Lafayette, Indiana, USA
RMS	– Naturhistoriska Riksmuseet, Stockholm, Sweden
RNHL	– Rijksmuseum van Natuurlijke Histoire, Leiden, Netherlands
SAM	– South African Museum, Cape Town, South Africa
SMD	– Staatliches Museum für Tierkunde, Dresden, Germany
SMW	– State Museum, Windhoek, Namibia
TMB	– Hungarian Natural History Museum, Budapest, Hungary
TMP	– Transvaal Museum, Pretoria, South Africa
UMMZ	– Zoological Museum, Ann Arbor, Michigan, USA
USNM	– Smithsonian Institution, Washington, D.C., USA
UZI	– Zoologiska Institutionen, Uppsala, Sweden
ZFMB	– Zoologische Museum Alexander Koenig, Bonn, Germany
ZMM	– Zoological Museum, Moscow, Russia
ZSM	– Zoologische Sammlung des Bayerischen Staates, Munich, Germany

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Preparation technique

Both dry, pinned and wet, alcohol-preserved, material have been available for study. For study of the male genitalia of dry material, the specimen for examination was softened in hot water (about 70 degrees Celcius) for 15–30 minutes. The apical sternites of the abdomen were then carefully detached, and if the hot water had softened the dried tissue around the genitalia sufficiently, the parameres and the penis were separated by dissection. In cases where the genitalia were still embedded in a thick layer of dried tissue after treatment in hot water, they were placed in a hot solution of KOH (about 10 %) for 10–20 minutes. After this treatment the genitalia were washed in water baths, and finally the penis and parameres were separated. For most illustrations of the male genitalia, dissected paramere and penis were placed in glycerine and then drawn using a Wild M 11 microscope provided with a camera lucida. For some of the largest species the procedure of softening the male genitalia was similar, but the illustrations were drawn using a Wild M 5 binocular provided with a suitable camera lucida. In such cases the male genitalia were placed in a drop of glycerine on a microscope slide. Before mounting the examined and illustrated genitalia, the glycerine was washed off with water. After this the genitalia were placed in absolute ethanol, dried and finally glued on the same card with the specimen or on a separate card. The genitalia of small species were often embedded in a drop of Euparal on the card with the specimen. Other morphological illustrations were made by merely using a Wild M 5 and a camera lucida.

Wet speciemns were dissected as such, and examined genitalia were treated similarly to dry material, in that the studied specimen was glued on a card. If an examined wet specimen was after dissection still preserved as wet, the genitalia were preserved in a microvial together with the specimen.

General information

Length and breadth of the body were measured with a micrometer in a Wild M 5 as follows: Length from anterior edge of frontal margin of head to extreme apex of elytra; breadth at broadest part of body (generally somewhat posterior to humeral region). From each sample I measured the largest and smallest specimens to get maximum variation. Sexes were not separated because all specimens

were not dissected. (In many species external examination is not enough for determination of sex.) Moreover there seem to be only minor variation in body size between sexes.

Whenever possible I used the holotype for descriptions and illustrations, supplemented with information from other material. If the holotype was not available I tried to use other type material initially.

Unless not otherwise stated, the description of the species is based on the male. – Characters which separate the female from the male are inserted under a section "Female" after the general description.

In this work species recognition is hampered in many cases by low numbers of specimens available for study. Moreover, the material is often collected from widely separated areas. Similarity in shape of male genitalia is regarded the most valuable criterion in the combination of specimens from different areas, although many species are difficult to delimit solely on such characters. In such cases similarity of various external characters helps in decision-making. Minor morphological variation, preferably supported by intermediates, is accepted for distant samples of material determined as belonging to the same species. Sympatry of divergent forms was a corroborative test of species status. Females were associated with males on the basis of co-occurrence and appearance of external features. Single female specimens were often left unnamed to species level. In most cases the available material is too limited to allow subspecific delimitation.

The methodological background of the phylogenetic part follows the principles of HENNIG (1965, 1966). In polarity determination I have tried to use the outgroup comparison-method as described by WATROUS & WHEELER (1981).

Within the recognized species groups, the species are simply placed according to similarity between different species (most similar species being placed close to each other).

Only a part of the material examined by previous authors has been re-examined in this study. For instance, distributional information in the literature may thus be based on misidentified specimens. Therefore, unverified distributional data is in many cases to be regarded as uncertain and in need of re-examination.

Old material in particular is sometimes inexactly labelled. In many cases only the country in question is given. The dot of the map is then either placed in the central part of the country or then the record has been omitted from the map.