

ISSN 0966 2235

LATISSIMUS

**NEWSLETTER OF THE
BALFOUR-BROWNE CLUB**



Number Fifty

October 2021

One hundred newsletters on, it is timely to remind everyone where we came from. Frank Balfour-Browne (1874-1967). Photograph originally published in the *Entomologist's Monthly Magazine* in 1968 as Plate 6 of issue 4 of volume **103** in association with his obituary.

ADDRESSES Contacts for articles and reviewed works are given at the end of this issue of ***Latissimus***. The address for other correspondence is: Professor G N Foster, 3 Eglinton Terrace, Ayr KA7 1JJ, Scotland, UK – latissimus@btinternet.com

OCHTHEBIUS LEJOLISII IN AN ARTIFICIAL HABITAT**John H Bratton**

The rocky coasts of Anglesey, North Wales, have provided numerous records of *Ochthebius lejolisii* Mulsant & Rey from small rock pools in the black lichen zone or higher. On 8 September 2015, I found several adult *O. lejolisii* in a puddle of unknown salinity in the top of a concrete crash barrier about 100 metres from the tip of Holyhead Breakwater, SH25598465, about 2 km from the nearest natural shore. Foster *et al.* (2020) noted that *O. lejolisii* flies readily.

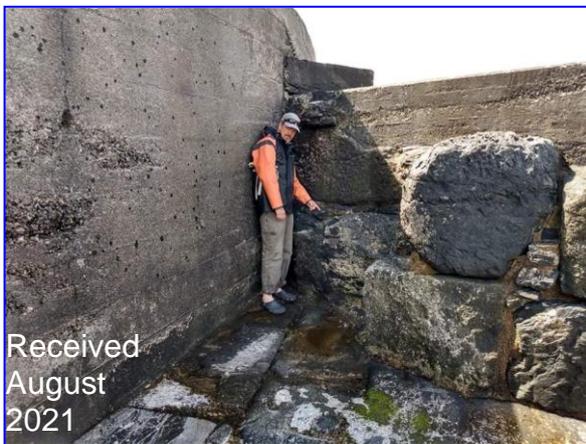


FOSTER G N, BILTON D T, HAMMOND M, NELSON B H, CHADD R & DENTON J S 2020. *Atlas of water beetles of Britain and Ireland - smaller families of Polyphaga*. Telford, FSC Publications for Biological Records Centre.

Received July 2021

OCHTHEBIUS LEJOLISII ON PLYMOUTH BREAKWATER**David T Bilton**

Plymouth Breakwater is a 1.5 km long stone structure, spanning the entrance to Plymouth Sound, built in the first half of the 19th century to provide safe anchorage for the Channel fleet. It has no connection to land, sitting in ca 10 m of water and is topped by a causeway 13 m wide, which is entirely submerged on spring tides. On 25 June 2021 I took the chance to visit the breakwater and found three adult *Ochthebius lejolisii* Mulsant & Rey in a small pool formed on the decayed remnants of a stone and concrete building at SX467505 which was above the reach of most tides. This species is common in natural rock pools around the South Devon coast, but this record demonstrates that it can also colonize suitable artificial structures out at sea. I am grateful to Louise Firth for the opportunity to land on the breakwater and to Richard Ticehurst for the photos.

Received
August
2021

THE DEVIL'S ADVOCATE IN THE SEARCH FOR THE INVASIVE WATER BEETLE

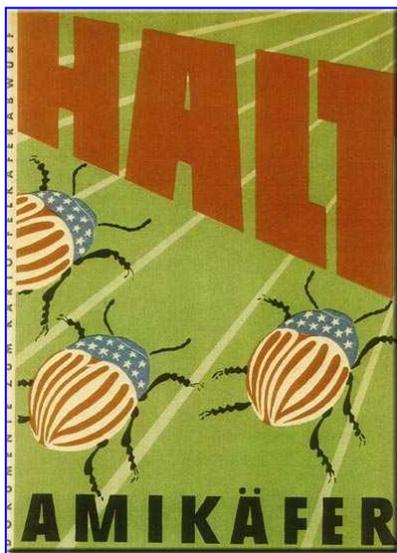
Anders N. Nilsson

Red-listing and black-listing

Seems the human mind is good at making up categories. When it comes to the other animals, they have long been characterised as harmful or beneficial, and forced into categories such as vermin, game, pet, feral, protected species, etc. The nowadays well-known conservation tool of red-listing was initiated by the IUCN back in 1964, and has since developed its own set of cumbersome subcategories like extinct or vulnerable (Bachman *et al.* 2019). Today, red-lists are updated on a regular basis, and are available at all scales from national to global, and include also many species of water beetles (Foster 2008). Of the species that have been evaluated based on enough data, those of *Least concern* have the lowest extinction risk, and thus can be looked upon as rather trivial. As this is as bad as it gets in red-listing, one quickly can see the need for a categorisation along some dimension other than extinction risk in order to handle the dark side of biodiversity. This “black-listing” counterpart to red-listing is today known as “Invasive Alien Species” or IAS, the subject of this text, with a focus on water beetles.

Invasive species, alien species, exotic pests, bio-pollution, non-indigenous species, or invasive alien species, are common names that categorize non-native animals, microbes, diseases, or plants that are pests. These pests are not native in areas in which they cause problems and they are considered “invasive” because they invade and establish populations in new areas and the resulting uncontrolled population growth and spread causes economic or environmental problems. (CISR 2021)

Legally, invasive species are outlawed and citizens are urged to kill them on sight. A distinction is sometimes made between restricted and prohibited species, depending on whether or not they are established in the area. The US joint project [Invasive.org](https://invasive.org) lists 3,461 invasive species, adding data from all states of the federation. On the other hand, the EU “common for all” list has only 36 plant and 30 animal species on it, with the Asian Hornet as its only insect, whereas 494 insect species are part of the US list. Of these, 187 species are beetles, of which almost all are plant-feeding or wood-boring, and dominated by the three families - cerambycids, chrysomelids, and curculionids. Australia lists only a handful of insect species as invasive, all of them belonging to the social aculeate hymenopterans.



One well-known introduced plant pest in Europe is the Colorado potato beetle (aka ten-striped spearman), *Leptinotarsa decemlineata* Say, native to the North American Rocky Mountains. It reached England by ship in 1876, without getting established, and has since then been eradicated in the United Kingdom at least 163 times. Gaining a foothold in France in 1922 it became widespread on the Eurasian continent after World War II. It is still expanding its range in China. In East Germany, it was known as “Amikäfer” following a governmental claim that the beetles were dropped by American planes (Wikipedia 2021). The species is also a good example of the problems of applying the term “invasive”. As restricted to agricultural monocultures, it is not “invasive in the usual environmental sense. It has no effects on the environment” (CABI 2021). On the

other hand, the same species may also be called “one of the most devastating invasive insects” (Wang *et al.* 2020).

The lack of water beetles on the lists fits well with the observations of Fenoglio *et al.* (2016) that aquatic insects rarely are viewed as invasive. On the US list, the aquatics are represented by a few mosquitoes, and more surprisingly also four odonate species. It seems the odonates are all tropical species that have colonised the Everglades, and their only fault is that they don't belong there. In contrast to freshwater insects, lots of fish species have been listed as invasive, and with introductions chiefly connected to aquaculture, ornamental fish industry, or living food (Kiruba-Sankar *et al.* 2018).

So far, I have not been able to find any water beetle species formally listed as invasive, which of course is not the same as to say they don't exist. I will here do my best to find some candidates, and two main routes for the search seems promising: species feeding on aquatic plants, and predatory species feeding on small fish or anuran larvae. As invasive species per definition have expanded their geographical range due to human activities, I will start by looking at water beetle range expansions, true or false.

Range expansions

Ordish (1966) noted the presence in New Zealand of the mainly West European black-bellied diving beetle, *Dytiscus semisulcatus* Müller. It seems a single sulcate female was found in the outback of the Wellington region in 1952, and then nothing more. The only possible explanation is that it had been introduced from Europe, probably brought over alive from England then, and released into the wild. Without the possibility to reproduce, this introduction never offered the alien species a chance to compete with the local big diver *Onychohydus hookeri* (White). The black-bellied female may have been brought over as a child's pet, and the owner may have taken this advice *ad litum*: "And if you have to part with them, you can safely release the native species into the wild, because they are a part of our nature" (Bateman & Hulcr 2021).

As being widespread in Europe, one could also think that the presence of *Rhantus suturalis* (Macleay) in New Zealand is due to an introduction by man. However, this extremely widespread species has seemingly made it on its own from New Guinea to Australia, New Zealand and large parts of Eurasia (Toussaint *et al.* 2013).

The Hawaiian island group is known for its large proportion of introduced animals, and this is also true for the hydrophilid water beetles, including at least three aquatic Nearctic species in the genera *Enochrus* and *Tropisternus* (Hansen 1995). The endemic species of *Limnoxenus* have seemingly evolved from aquatic to terrestrial *in situ*, and of the three stream-living species one is extinct and the other two decreasing (Short & Liebherr 2007). As the *Limnoxenus* decline seemingly is caused by habitat degradation and introduction of fish, the introduced aquatic hydrophilids are hardly invasive. Among the dytiscids the Nearctic *Hygrotus nubilus* (LeConte) has an isolated occurrence in Hawaii, and seemingly was carried there by migrating birds in about 1975 (Challet & Fery 2020). As its range expansion is due to natural causes, the species is not invasive.

In West Europe only a few species of diving beetles display marked range expansions during the last fifty years. The two species *Hygrotus nigrolineatus* (von Steven) and *Nebrioporus canaliculatus* (Lacordaire) both primarily inhabit man-made habitats such as gravelpits, and spread north- and/or westwards from the 60s onwards (Schaefflein 1987). Their preference for man-made habitats may provide a basis for calling them alien, but the lack of documented negative environmental effects makes it hard to classify them as invasive. The *Hygrotus* species was even placed on the Austrian red-list for a time (Wewalka 1983).

The more recent expansion of *Cybister lateralimarginalis* (De Geer) and *Hydrovatus cuspidatus* (Kunze) may more likely be attributed to a climatic warming caused by human activities. *Cybister* has seemingly expanded in or recolonised Sweden after 2000, colonised Finland since 2006, and also expanded its range in European Russia northwards (Prokin & Cherevichko 2017). A single specimen was observed in England in 2005. As the species so far chiefly is reclaiming lost territory, with the exception of Finland, it can hardly be classified as alien. However, as noted by Hendrich (2011), its presence may pose another threat to Europe's most iconic water beetle species, The Big D, *Dytiscus latissimus* L., based on larval predatory interactions. The Russians have documented the co-existence of both species in lakes (Prokin & Cherevichko 2017). If future studies will affirm Hendrich's suspicions, this could indeed provide a basis for viewing *Cybister* as invasive.

Species introductions

The relatively few water beetle species displaying more recent range expansions in Europe may in the future be accompanied by lots of Iberian endemics due to the efforts of conservationists, should the ideas of Chris Thomas (2011) get a broader acceptance. The idea is simply to save local high altitude endemics from extinction caused by drought in connection with climate change, by transporting them to safer areas. Among the target species he mentioned are 120 species of Iberian endemic water beetles, and the suggested destination is Great Britain. This idea will lead the thoughts to an older case of two Spanish species' unexpected occurrence on some Scottish Isles.

The British botanist John W. Heslop-Harrison salted some tubes with beetles supposedly collected on the Hebrides sent to Frank Balfour-Browne with specimens of *Aulonogyrus striatus* Fab. and *Nebrioporus canariensis* (Bedel), in fact collected on the Canary Islands. Also the montane *Hydroporus foveolatus* Heer, known from the Alps and the Pyrenees was included. Balfour-Browne (1953) swallowed the bait and wrote about these three species as they occurred in the Hebrides. In fact, they had never been collected there (Foster 1992; Sabbagh 1999). Unlike the foreign plants Heslop-Harrison did plant on the Hebrides, the beetles were most likely already dead when put in tubes together with material collected on the Hebrides. As they never were introduced to the British Isles, they did not get the chance to become invasive. But the records continued to be cited for many years before being exposed as fraud. If realised, the displacement programme suggested by Chris Thomas will give Heslop-Harrison's activities the aura of being visionary.

On the contrary, the presence of *Agabus bipustulatus* (L.) in the Azores is seemingly due to a more recent introduction by man, most likely together with aquatic plants (Drotz 2003). The species was first reported from the island of São Jorge in 1970 and has then spread to three other islands (Azorean Biodiversity Portal 2021). Any possible interactions with the Azorean endemic *Agabus godmanni* Crotch wait to be investigated.

Weed-controlling weevils

In order to control some aquatic plants that have become invasive, a selection of weevils feeding on them have been introduced to many different parts of the world, chiefly from South America. In warmer areas, the Amazon native water hyacinth, *Pontederia crassipes* von Martius, has become a serious invasive pest due to its capacity of choke up water bodies. The weevil *Nechochetina eichhorniae* Warner was introduced from Argentina to Florida in the early 70s, and has later been followed by

more species to other parts of the world, such as the African Lake Victoria (University of Florida 2021a).

A similar story exists for the water fern or giant salvinia, *Salvinia molesta* Mitchell, native to Brazil, and introduced to most warmer regions on the other continents, often together with its relative *Salvinia minima* Baker. As a control agent, the Neotropical salvinia weevil, *Cyrtobagous salviniae* Calder & Sands, has been introduced to 17 countries outside Brazil, including south-east USA and Australia (Akua 2021; University of Florida 2021b). The weevil spread rapidly and by 2001 was present in 77% of all Florida water bodies. The 49,000 specimens released in Senegal seemingly made a good job (Pieterse *et al.* 2003). Another example is the weevil *Neohydronomus affinis* Hustache, also from South America, feeding on the invasive water lettuce, *Pistia stratiotes* L., when introduced to south-east USA and Australia (Dray *et al.* 1990).

So far, no weevils have been used in biological control of the invasive Australian stone crop, *Crassula helmsii* (Kirk), first naturalised in Great Britain in 1956 and now widespread in West Europe (Denton 2001; Smith & Buckley 2020). The time may come though, as native weevils are known to feed on it in Australia and New Zealand. So far, more or less host-specific aquatic weevils have been an important tool in controlling invasive aquatic plants in the warmer regions. As far as I know, no serious problems have been caused by these introduced weevils that thus cannot be called invasive though truly alien. Any eventual host shifts have to be paid attention to though.

Besides invasive plants, water beetles have also been shown to be affected negatively by invasive species of crayfish, in Europe chiefly red swamp crayfish, *Procambarus clarkii* (Girard), native to Mexico and the south-east USA. *Procambarus* have been introduced to other continents as well as other parts of USA, and in relation to water beetles severe problems have been reported from southern Europe (Foster & Bilton 2014).

Water tigers

One Swedish author mentioned in a small book on freshwater invertebrates that in the 40s when he worked at some fish nurseries in Aneboda, Småland, the ponds were full of *Dytiscus* beetles, including hundreds of The Big D, that were caught in some meshwork when the ponds were emptied in the autumn (Sjögren 1969). He noted then that the big diving beetles were by tradition looked upon as serious pests by fish farmers. The classic text on this issue is the monograph by Wilson (1923), in which *Dytiscus* larvae as fish eaters are called “water tigers”. Wilson reproduced some anecdotal observations from a fish hatchery in Minnesota where large dytiscid larvae attacked black bass 5 cm juveniles: “The dytiscid larvae seized the fish by its throat and plunged its powerful mandibles into the flesh near the heart. After sucking the blood a moment it dropped the fish and attacked another, until the destruction became enormous.” Also, the larvae of *Dineutus* and *Hydrophilus* were observed to consume fish fry under specific conditions. When it comes to large adult water beetles, Wilson (1923) found the evidence of their supposed feeding on small fish unconvincing.



The Chinese mitten crab, *Eriocheir sinensis*, is viewed as a delicacy in China, where it is also raised in ponds. In Europe and North America it is viewed as highly invasive. Larvae of large dytiscids attacking crabs is a problem in Chinese breeding ponds, and controlled by the addition of toxic chemicals (Zhao *et al.* 2011).

With reference to The Big D, Hendrich (2011) concluded that the design of modern ponds for fish breeding in Germany is no longer suitable for *Dytiscus* reproduction. Thus their presence is seemingly no longer a major cause of economic harm within this trade. On the other hand, water beetle predation has more recently become a conservation issue in relation to anurans and endemic fish species. The rarest fish on earth, the Devil's Hole Pupfish, *Cyprinodon diabolis* Wales, confined to a single Nevada cavern, in 2013 down to 35 individuals, and with a captivity breeding program sabotaged by diving beetles feeding on eggs and larvae (Bittel 2019). The breeding team was reported to have removed ten thousand beetles from their fish tanks.

The global decrease of amphibians has resulted in a rich plethora of conservation projects, including reintroductions and translocation of species, with frequent failures being potentially attributed to water beetle predation: "Although amphibian conservation plans expect some losses from natural predation, diving beetles may affect conservation efforts such as captive breeding and reintroductions with populations where every individual is critical to success" (Valdez 2019). In Europe, the common *Dytiscus marginalis* L. is highly adapted to exploiting tadpoles of early breeding anurans as the major prey for its larval development, and each larva is able to consume hundreds of tadpoles (Möller 2001). Besides the two caddis larva-feeding species, *D. latissimus* and *D. semisulcatus*, the larvae of all other European *Dytiscus* species feed chiefly on tadpoles. As a rule, they breed later in season than *D. marginalis*, and display some habitat separation (Möller 2001).

As the *Dytiscus* species are all native and not alien within their present areas of distribution, their supposed negative impact on anuran conservation projects can hardly justify some waving of the invasive flag. But say that some island with endemic frogs but without *Dytiscus* beetles, was to be colonised by some big diver, that like *Cybister* had started to expand its range. It's not hard to imagine that it would be declared invasive, when considering the traditional glorification of vertebrates relative to insects.

The worldwide amphibian decline has also been linked to pathogen chytrid fungi in the genus *Batrachochytrium*. As some studies have shown that the pathogen also can be found in invertebrates sharing the habitats of the amphibians, including water beetles like the gyrid genus *Dineutus*, these may be involved in the spread and local maintenance of the fungus (Strauss & Smith 2013).

Conclusion

It seems my efforts to find any invasive water beetle species were not very successful. The best I could do was to identify some areas of interest, where they may be considered to create havoc, once the correct circumstances will appear. The future publication of some pictures from Finland of *Cybister* larvae killing and feeding on the larvae of The Big D may change the situation though. Especially so as the "jumusukeltaja" arrived in Finland from the not always very popular neighbour Russia.

References

- AKUA N 2021. The invasive weed that travelled the world. BBC, Future planet, <https://www.bbc.com/future/article/20210329-the-humble-beetle-that-could-rescue-a-town>.
- The Azorean Biodiversity Portal 2021. *Agabus bipustulatus* <http://azoresbiportal.uac.pt/azores-species/agabus-bipustulatus-7393>
- BACHMAN S P, FIELD R, READER T, RAIMONDO D, DONALDSON J, SCHATZ G E & LUGHADHA E N 2019. Progress, challenges and opportunities for Red Listing. *Biological Conservation* **234** 45-55.
- BALFOUR-BROWNE F 1953. The aquatic Coleoptera of the Western Scottish islands with a discussion of their sources of origin and means of arrival. *Entomologist's Gazette* **4** 79-127.
- BATEMAN C & HULCR J 2021. Predaceous diving beetles as pets and the self-cleaning aquarium, <https://edis.ifas.ufl.edu/publication/FR398>.
- BITTEL J 2019. Brutal beetles kept world's rarest fish from breeding—until now. <https://www.nationalgeographic.com/animals/article/endangered-devils-hole-pupfish-breeding-breakthrough>.
- CABI 2021. Invasive species compendium. *Leptinotarsa decemlineata* (Colorado potato beetle), <https://www.cabi.org/isc/datasheet/30380#tosummaryOfInvasiveness>.
- CISR 2021. Center for Invasive Species Research, <https://cizr.ucr.edu>.
- CHALLET G & FERY H 2020. Rediscovery of *Hygrotus* (*Leptolambus*) *artus* (Fall, 1919), description of *Hygrotus* (*L.*) *yellowstone* nov. sp. and notes on other species of the genus (Coleoptera, Dytiscidae, Hydrophilinae, Hygrotini). *Linzer biologische Beiträge* **52** 37-79.
- DENTON J 2001. What impact does *Crassula helmsii* have on aquatic beetles? *Latissimus* **13** 17-18.
- DRAY F A jr, CENTER T D, HABECK D H, THOMPSON C R, COFRANCESCO A F & BALCIUNAS J K 1990. Release and establishment in the southeastern United States of *Neohydronomus affinis*, an herbivore of water lettuce. *Environmental Entomology* **19** 799-802.
- DROTZ, M K 2003. Speciation and mitochondrial DNA diversification of the diving beetles *Agabus bipustulatus* and *A. wollastoni* (Coleoptera, Dytiscidae) within Macaronesia. *Biological Journal of the Linnean Society* **79** 653-666.
- FENOGLIO S, BONADA N, GUARESCHI S, LÓPEZ-RODRÍGUEZ M J, MILLÁN A & TIerno DE FIGUEROA J M 2016. Freshwater ecosystems and aquatic insects: a paradox in biological invasions. *Biology Letters* **12** 20151075. <http://dx.doi.org/10.1098/rsbl.2015.1075>
- FOSTER G N 1992. Rum beetles. *Latissimus* **1** 21.
- FOSTER G N 2008. Red lists for Europe. *Latissimus* **24** 14-19.
- FOSTER G N & BILTON D T 2014. The conservation of predaceous diving beetles: knowns, unknowns and anecdotes, 437-461 in: D.A. Yee (ed.) *Ecology, systematics, and the natural history of predaceous diving beetles* (Coleoptera: Dytiscidae). Dordrecht: Springer.
- Hansen M 1995. A review of the Hawaiian Hydrophilidae (Coleoptera). *Pacific Science* **49** 266–288.
- HENDRICH L 2011. Mythos Breitrand – vom Leben und „leisen Sterben“ des zweitgrößten Schwimmkäfers der Welt (Dytiscidae: *Dytiscus latissimus* Linnaeus, 1758). *Nachrichtenblatt der bayerischen Entomologen* **60** (1-2) 2-9.
- KIRUBA-SANKAR R, PRAVEEN RAJ J, SARAVANAN K, LOHITH KUMAR K, RAYMOND JANI ANGEL J, AYYAM VELMURUGAN & DAM ROY S. 2018. Invasive species in freshwater ecosystems – threats to ecosystem services, 257-296 in: Chandrakasan Sivaperuman, A. Velmurugan, A.K. Singh & I. Jaisankar (eds) *Biodiversity and climate change adaptation in tropical islands*. Academic Press.
- MILLER K B 2002. Revision of the genus *Eretes* Laporte, 1833 (Coleoptera: Dytiscidae: Dytiscinae: Eretini). *Aquatic Insects* **24** 247-272.
- MÖLLE J G 2001. Zur Bedeutung von Amphibienlarven für die Populationsentwicklung des Gemeinen Gelbrandkäfers *Dytiscus marginalis*, L. 1758. Doctorial dissertation, Rheinischen Friedrich-Wilhelms-Universität Bonn.
- ORDISH R G 1966. A systematic revision of the New Zealand water beetles (Coleoptera: Dytiscidae). *Records of the Dominion Museum* **5** 217–264.

- PIETERSE A H, KETTUNEN M, DIOUF S, NDAO I, SARR K, TARVAINEN A, KLOFF S & HELLSTEN S 2003. Effective Biological Control of *Salvinia molesta* in the Senegal River by Means of the weevil *Cyrtobagous salviniae*. *AMBIO: A Journal of the Human Environment* **32** 458-462.
- PROKIN A & CHEREVICHKO A 2017. Naturalisation of *Cybister lateralimarginalis* in the north of European Russia confirmed by the finding of larva. *Latissimus* **40** 18-19.
- SABBAGH K 1999. The Rum affair – Heslop Harrison's rarities. London: Penguin.
- SCHAEFLEIN H 1987. Das Vorkommen von *Coelambus lautus* Schaum, 1843, mit nomenklatorischen, faunistischen und ökologischen Bemerkungen (Coleoptera, Dytiscidae). *Entomofauna* **8** 309-332.
- SHORT A E Z & LIEBHERR J K 2007. Systematics and biology of the endemic water scavenger beetles of Hawaii (Coleoptera: Hydrophilidae, Hydrophilini). *Systematic Entomology* **32** 601-624.
- SJÖGREN B 1969. *Små djur i våra sötvatten*. Gothenburg: Zinderman.
- SMITH T & BUCKLEY P 2020. Biological Flora of the British Isles: *Crassula helmsii*. *Journal of Ecology* **108** 797-813.
- STRAUSS A. & SMITH K G. 2013. Why does amphibian chytrid (*Batrachochytrium dendrobatidis*) not occur everywhere? An exploratory study in Missouri ponds. *PLOS ONE* **8** (9) e76035.
- THOMAS C D 2011. Translocation of species, climate change, and the end of trying to recreate past ecological communities. *Trends in Ecology and Evolution* **26** 216-221.
- TOUSSAINT E F A, SAGATA K, SURBAKTI S, BALKE M & HENDRICH L. 2013. Australasian sky islands act as a diversity pump facilitating peripheral speciation and complex reversal from narrow endemic to widespread ecological supertramp. *Ecology and Evolution* 2013 April, doi: 10.1002/ece3.517.
- UNIVERSITY OF FLORIDA 2021a. Mottled water hyacinth weevil. https://entnemdept.ufl.edu/creatures/BENEFICIAL/BEETLES/Neochetina_eichhorniae.html
- UNIVERSITY OF FLORIDA 2021b. Salvinia weevil. https://entnemdept.ufl.edu/creatures/BENEFICIAL/BEETLES/salvinia_weevil.html
- VALDEZ J W 2019. Predaceous diving beetles (Coleoptera: Dytiscidae) may affect the success of amphibian conservation efforts. *Australian Journal of Zoology* **66** 352-355.
- WANG C, XU H & PAN X.-B 2020. Management of Colorado potato beetle in invasive frontier areas. *Journal of Integrative Agriculture* **19** 360-366.
- WEWALKA G 1983. Rote Liste der gefährdeten Schwimmkäfer Österreichs (Dytiscidae, Coleoptera). *Rote Listen gefährdeter Tiere Österreichs* **1** 123-126.
- Wikipedia 2021. Colorado potato beetle. https://en.wikipedia.org/wiki/Colorado_potato_beetle
- WILSON C B 1923. Water beetles in relation to pondfish culture, with life histories of those found in fishponds at Fairport, Iowa. *Bulletin of the United States Bureau of Fisheries* **39** 231-345.
- ZHAO C, ZHOU X & HUA X 2011. Acute toxicity for larval dytiscids as harmful organism on ecologic breeding of *Eriocheir sinensis* in earth pond. *Chinese Agricultural Science Bulletin* **27** 425-429.

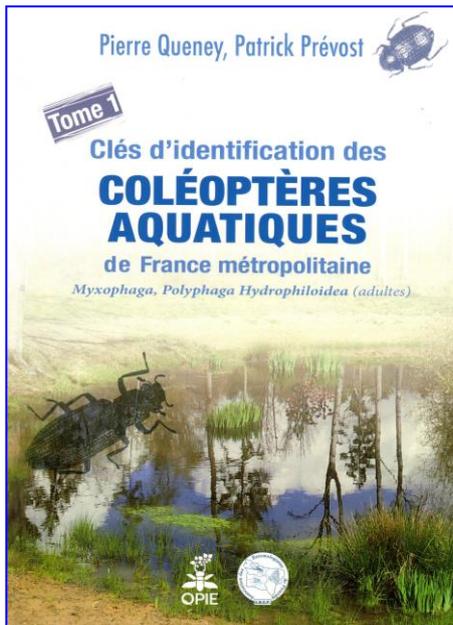
Received July 2021

LIMNICHIDAE IN ANGOLA

Simplocarina angolensis and *Byrrhinus angolensis* are newly described as the first limnichids known from Angola along with *S. curticollis* Pic. The photograph is of the camp at Cassamba for the Mussuma Expedition of the National Geographic Okavango Wilderness project.

MATSUMOTO K 2021. New species and records of Angolan Limnichidae (Coleoptera: Byrrhoidea). *Zootaxa* **4985** 111-117.





NOUVELLE APPROCHE

📖 QUENEY P & PRÉVOST P 2021. *Clés d'identification des coléoptères aquatiques de France métropolitaine. Tome 1: Myxophaga, Polyphaga Hydrophiloidea (adultes). (y compris espèces terrestres).* Compiègne: ADEP y Guyancourt: Opie. 45€ from <https://www.insectes.org/naturaliste/124-cle-des-coleopteres-aquatiques-adultes-de-france-metropolitaine.htm>

Part of the new approach here is to start with water beetles other than the Hydradephaga. This is a most welcome addition to the books kept by the microscope, and it will be near the top of the pile most of the time. The photographic treatment covers all useful morphology, and is particularly useful for *Helophorus* and *Enochrus* aedeagi, and for the distinguishing features of *Cercyon*. “Clés” certainly, but the approach is based more on

“tableaux”. This book will find much wider usage than just “France métropolitaine” (i.e. European France including Corsica), particularly in southern England where some additional species are anticipated. *Hydrobius fuscipes* (L.) and *H. rottenbergii* Gerhardt are distinguished but *H. subrotundus* Stephens is not tabled “en raison d’une caractérisation morphologique insuffisant pour justifier un détachement de *H. fuscipes*.” The same presumably applies to *Megasternum immaculatum* (Stephens), which does not get a mention.

ADEPHAGAN EVOLUTION

The development of genomics is at such a pace that more and more combinations of words appear meaningless to those not involved. The basis of this paper is a new set of DNA-hybridisation baits that can be used to detect nucleic acids coding for proteins informative in following the evolution of the Adephaga. Some phylogenetic relationships have been clarified such as the sister group relationship of Gyrinidae to all other families and the clade Haliplidae + Dytiscoidea. All Dytiscidae subfamilies were confirmed as monophyletic. In contrast to other studies Coptotominae + Lancetinae is considered sister to all other diving beetles. The authors corroborate Anders Nilsson’s prediction in 1989, based on morphology, that “dytiscid phylogeny will most probably be difficult to reconstruct, because of widespread convergent evolution”.

VASILIKOPOULOS A, BALKE M, KUKOWKA S, PFLUG J M, MARTIN S, MEUSEMANN K, HENDRICH L, MAYER C, MADDISON D R, NIEHUIS O, BEUTEL R G & MISOF B 2021. Phylogenomic analyses clarify the pattern of evolution of Adephaga (Coleoptera) and highlight phylogenetic artefacts due to model misspecification and excessive trimming. *Systematic Entomology* doi: 10.1111/syen.12508

JAPANESE ELMIDS

This description of the new species, *Zaitzeviaria tukafumii*, is marked by stereoscans including those of the fully extended endophallus of the aedeagus.

HAYASHI M & YOSHITOMI H 2021. A new species of *Zaitzeviaria* from Aichi Prefecture, Honshu, Japan (Coleoptera: Elmidae). *Japanese Society of Systematic Entomology* **27** 43-51.

AQUATIC BEETLE LIVING IN THE CITY STREETS OF TAIWAN

Hsing-Che Liu

In Taiwan, streets in cities are usually dry and light-polluted. Beetles can be only occasionally found in temporary pools after rains (*Berosus elongatulus* Jordan, 1894, *Eretes griseus* (Fab., 1781) and *Hydroglyphus amamiensis* (Satô, 1961)) and no aquatic beetles can live there for a long time. However, recently I discovered that *Coelostoma phallicum* d'Orchymont, 1940 may adapt to this harsh environment (Fig. 1). This species inhabits the streets of Zhudong Township, Hsinchu County, Taiwan. These do not have any small ponds, only dirty water ditches (Figs 2–3). The inner side of the ditch is always wet (Fig. 4), with dirty water only sometimes on the side nearest to the road, providing a suitable environment for the beetle.

There are seven species of *Coelostoma* distributed in Taiwan, but I have only found *C. phallicum* to inhabit water ditches in city streets so far. The current research shows that one Taiwanese *Coelostoma* species inhabits rice fields, two inhabit ponds, and the other four, including *C. phallicum*, inhabit edges of streams and rivers (Liu *et al.* 2020). In stream-side habitats, *Coelostoma* species usually hide under stones and among roots of plants growing on the gravel river banks during the day, but were observed to feed on algae-covered wet rocks or wet substrate at night. These habitats resemble the concrete walls of the water ditches on which I found *C. phallicum* in Zhudong.



Figures 1-4 *Coelostoma phallicum* d'Orchymont, 1940 in ditches of the Zhudong Township. (1) Habitus (dorsal view) and aedeagus (2–4). Details of water ditches in which the species was found. Photos by Uitsiann Ong (1) and H.-C. Liu (2–4).

LIU H-C, HU F-S & FIKÁČEK M 2020. Review of the genus *Coelostoma* of Taiwan with description of a new species (Coleoptera: Hydrophilidae). *Acta Entomologica Musei Nationalis Pragae* **60** (1) 155-162.

劉興哲 [je](#)

GENETIC EXPERIMENTS ON *HELOPHORUS* FAB. – REVISITED AFTER HALF A CENTURY

Robert Angus

Introduction

In October 1966 I began my D. Phil. research in the Zoology Department of Oxford University with Dr E. R. Creed as my supervisor in the Ecological Genetics section headed by Professor E. B. Ford. My research topic of choice was investigation of the species status of various *Helophorus* species whose taxonomic status was a matter of dispute. Crucial to these studies would be successful rearing of the beetles in the lab. and serious attempts at hybridisation between them. This was a tall order and I was told by various people that I would not be able to do it, and so, by way of a safety net, the title of my project included both *Helophorus* and the fruit fly *Drosophila*, as *Drosophila* was a well-known laboratory animal. The plan was to drop one of these genera after a year, depending on how well *Helophorus* work was going. Well, suffice it to say that *Drosophila* was the genus dropped!

Revisiting this research allows me to illustrate some of the specimens involved, using the stacking photography setup in the Sackler Photoimaging Laboratory of the Natural History Museum in London, where the material is now housed. British specimens, including those used in crosses within species, are housed in the British Collection and hybrids and specimens used in species hybridisation experiments, are housed in the General Collection.

It also enables me to share some of the colour photographs of the egg cocoons, taken by Peter Parks, later of Oxford Scientific Films but then developing his macrophotography setup in the Oxford University Museum. Part of his agreement with the Museum for use of a large room was that he would photograph suitable material generated by any of us D. Phil. students. One of the early joys of my research was obtaining these hitherto unknown egg cocoons. Within weeks of starting I had the egg cocoons of *H. fulgidicollis*, *H. strigifrons* and *H. obscurus*, all clearly different from one another (Plate 1 i–k, Plate 4 g j). Peter photographed these, and other cocoons, on to Kodachrome slides, of which I have several boxes.

The basic idea was to investigate the causes of discontinuous variation in *Helophorus*. The possible causes were considered to be environmental threshold factors together with genetic polymorphism and speciation. The research was designed to address each of these possible mechanisms in turn. The localities from which material was obtained are listed in Table 1 with their latitude and longitude and the species involved. Unless otherwise stated, the localities are British.

Possible environmental factors – investigations with *H. fulgidicollis*

Methods of rearing *Helophorus* were given by Angus (1970). *H. fulgidicollis* from Lymington (Table 1) was reared for six generations, starting in October 1966. In both my thesis and the published version (Angus 1970) I gave the start date as October 1967. This is wrong – not only does my lab. diary describe the initial rearing in 1966 in detail, but among the preserved material in the NHM is an F2 ♀ labelled “June 1967”. For evaluation of the material for any signs of change to *H. flavipes* six characters were used: 1. Aedeagus of the *H. fulgidicollis* pattern, with straight outer margins of the parameres and short struts (Plate 1 e f) versus the *H. flavipes* pattern, with curved outer margins of the parameres and long struts (Plate 5 a–c); 2. Tibiae and tarsi with long (*H. fulgidicollis*-pattern) or shorter (*H. flavipes* pattern) swimming-hairs (Angus 1966); 3. Adult beetles able to swim and dive in open water (*fulgidicollis*) or remain trapped at the water surface until they reach vegetation along which they can crawl (*flavipes*); 4. Adults lay eggs about two weeks after emergence (*fulgidicollis*) or do not lay eggs till at least three months after emergence (*flavipes*);

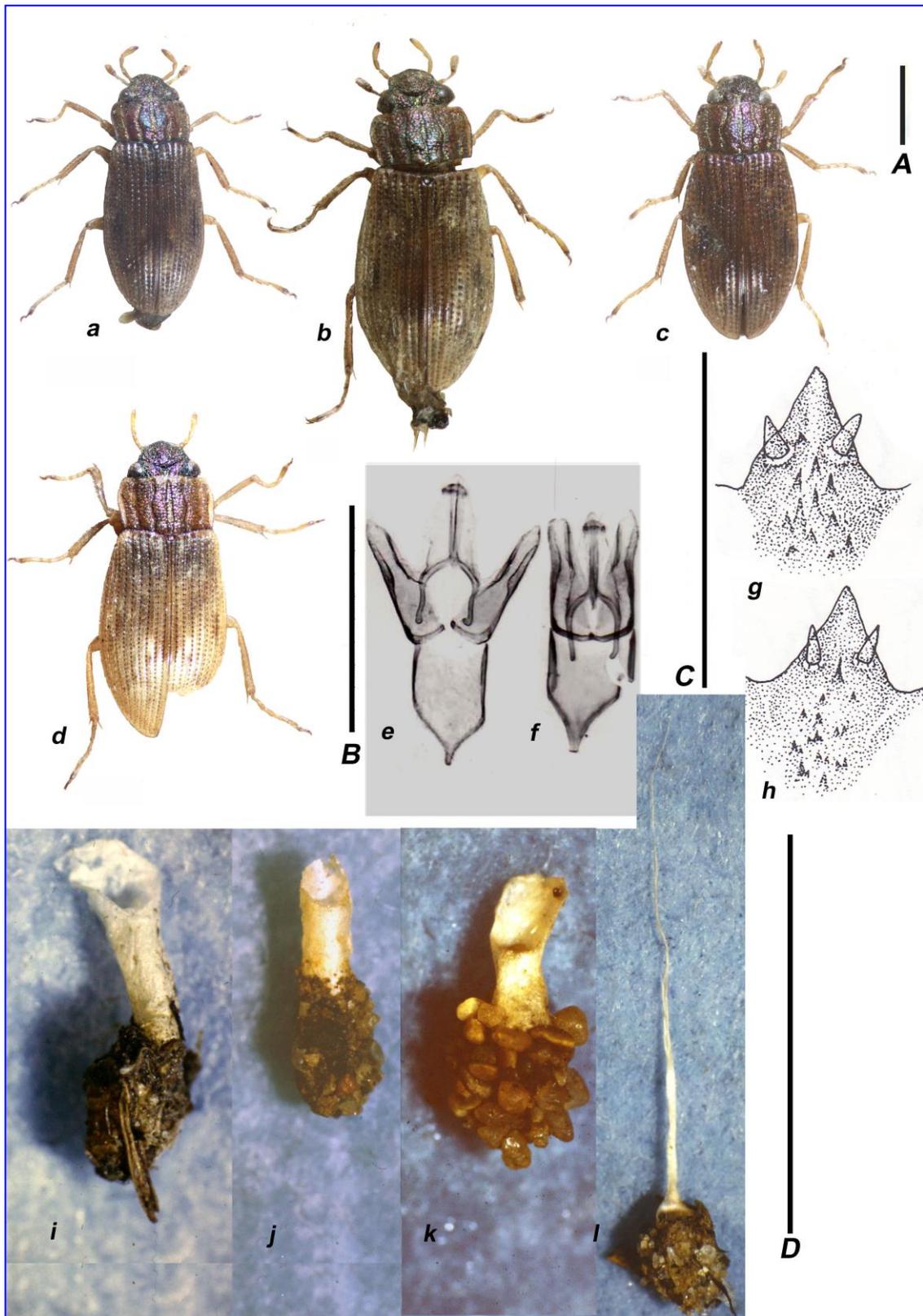


Plate 1 Experiments with *H. fulgidicollis*. **a – d** adult beetles. **a** from Lymington, not a parent of lab. stock as taken in April 1968; **b** lab. F3 ♀; **c**, lab. F6 ♂. **e f** aedeagi from Lymington, **e** parental, **f** lab. F6. **g h** nasales of 3rd instar larvae to show the teeth on the underside, drawings by Sarah Wroot, from Angus (1992), **g** *H. fulgidicollis*, **h** *H. obscurus*. **i–l**, egg cocoons. **i j** *H. fulgidicollis* from Lymington, **i** taken in March 1967, **j** F4; **k** *H. fulgidicollis* from the Camargue, France; **l** *H. flavipes* from the New Forest. Scale **A** = 1 mm for **a–d**, scale **B** = 0.5 mm for **e f**, scale **C** = 0.1 mm for **g h**, scale **D** = 5 mm for **i–l**

5. Egg cocoon has an erect tubular mast (Plate 1 i–k) (*fulgidicollis*) or a thin, trailing ribbon- or thread-like mast (Plate 1 l) (*flavipes*); 6. Third instar larva has strong teeth on the roof its mouth in the area of the nasale (Plate 1 g) (*fulgidicollis*) or much finer teeth, as in *H. obscurus* (Plate 1 h) (*flavipes*). Apart from a delay in the onset of egg-laying after three generations, the beetles showed no tendency to acquire any of the *H. flavipes* characters in the course of the six generations of this experiment. The F4 beetles did not lay eggs till three months after emergence, and neither did the single F5 female. The sixth (F6) generation comprised only a single male whose adult characters, including swimming ability, were typical *H. fulgidicollis* (Plate 1 c f). These results suggest a loss of vigour and fertility in the F4 and F5 generations.

Plate 1 a–c shows *H. fulgidicollis* as fairly dark with some orange or maroon reflections on the pronotum. This is in accord with the impression given by Frank Balfour-Browne (1958) that “*H. mulsanti*” (the name used at that time by British authors for *fulgidicollis*) was not so very different from *flavipes*. As a result of this impression I was completely perplexed by the pale and shining specimen taken on Walney Island in 1963, shown in Plate 1 d. When I went up to Oxford in October 1963, I brought the specimen with me and in due course took it up to the Natural History Museum in London where I showed it to Jack Balfour-Browne. Very carefully he explained that without knowing how the population ran (morphologically) it couldn’t really be identified as either *flavipes* or *mulsanti*. I still remember the impish glee on his face at my astonished response “Is that *mulsanti* ?!”. But this specimen set me thinking of something that had puzzled me for some years. In about 1952 I took a small pale *Helophorus* in a pool on the saltmarshes bordering Findhorn Bay, and was surprised to see that it swam about in a jar of water, rather like a somewhat slow *Haliphus*. Later I attempted to repeat the observation with a pale *Helophorus* taken in the school grounds (Altyre House, Forres) – with a complete lack of success. Following Balfour-Browne’s book, the only small pale *Helophorus* in Morayshire was *H. brevipalpis* Bedel, which cannot swim at all. But now I wondered if the pale swimmer of Findhorn Bay was in fact *H. fulgidicollis*.

In the second year of the Oxford Zoology course we had a marine biology field course based at the University of Swansea, and this included a small research project. I managed to persuade Professor David Nicholls, who ran the course, that saltmarshes were part of the marine environment, and duly spent a very pleasant day experimenting with *Helophorus* in the small pools on the Llanrhidian saltmarshes – and so discovered the swimming ability of *H. fulgidicollis*, later writing this up (Angus 1966).

Genetic polymorphisms within species

In 1970 there was only one published case of a polymorphism in a *Helophorus* species – the brachypterous form of *H. granularis*, described by Sharp (1914) as a separate species, *H. ytenensis*. Sharp (1916) described his *ytenensis* as being widespread in England and also occurring in southern Scotland and Northern Ireland. It was unknown outside of the British Isles. The proportion of *ytenensis* in samples of *H. granularis* varies widely. In a sample of more than 150 specimens taken in the Sway ponds (New Forest) I found only *ytenensis*, though Sharp stated that at Brockenhurst, only about 5 km away, the population contained about 3% macropters. In small pools on Otmoor (Oxford) the population was almost entirely macropterous, with only three *ytenensis* taken in a sample of about 150 individuals.

I found this polymorphism very difficult to investigate because ascertaining the wing structure required the lifting of an elytron and at least partial spreading of a wing – something I was largely unable to do without injuring the specimen. In March 1967 I

received a pair of living *H. granularis* taken at Blackboys, Sussex by Garth Foster who said he thought all the material there was macropterous. I put these specimens, a male and a female, in a breeding aquarium and in due course obtained about 20 adult offspring. I then checked the female parent (the male had by this time died and decomposed) and found it to be *ytenensis*. I then checked 10 of the adult offspring, and these too were *ytenensis*. By this time, it was too late to obtain fresh macropters from Otmoor, so I put the remaining F1 offspring of the Sussex pair to breed among themselves. These in due course produced 15 F2 offspring, all *ytenensis*. In November 1967 I took three macropterous males on Otmoor and put them with the last surviving F2 female of the Sussex stock. This gave three egg cocoons and 10 adult offspring, 9 macropters and one *ytenensis*. Plate 2 **a–f** shows wings of these beetles. **a** (macropterous) and **b** (*ytenensis*) are from Otmoor; **c** is *ytenensis* from the Sway ponds; **d** *ytenensis* lab F1 from the Sussex stock; **e–g** are offspring of the F2 Sussex *ytenensis* female and macropterous males from Otmoor. **e** is *ytenensis*, **f g** macropterous, **g** a very small specimen but identified as macropterous by the length of the membranous part of the wing extending beyond the sclerotised costal margin. These results confirm that *ytenensis* and macropterous *granularis* are members of a genetic polymorphism within *H. granularis* but are not sufficient to indicate which form is dominant and which recessive.

As mentioned above, the *ytenensis* form was unknown outside the British Isles, but since then I found it in the area of the Cantabrian mountains in northern Spain in April 1985 (Angus 1992).

Elytral colour in *H. obscurus* and *H. strigifrons*

When sampling *H. obscurus* in the Oxford district I was struck by the occurrence of occasional specimens with the elytra clear pale yellow with a dark sutural ▲-mark. In the Otmoor pools and in Wytham Wood it accounted for perhaps 1% of the populations but near Stonesfield it represented nearer 10% of the specimens taken. Plate 2 **h** shows a normal dark coloured *H. obscurus* obtained as an F2 from a pale X pale cross, while **i** shows a pale lab. F1 specimen reared from Wytham Wood stock. I reared these pale specimens and set up crosses pale X pale, pale X dark and dark X dark. The first two gave a mixture of the pale and dark forms but the dark X dark cross gave only dark offspring. This means that the pale form is a rare dominant, an unusual result. Later I confirmed this using a pale female taken in the Wyre Forest, Worcestershire in August 1974. It seemed possible that at that time of the year the female might be unmated, so to check this I kept it in an aquarium with male *H. flavipes*. It began laying eggs in January 1975, but none showed any development, indicating that the female was indeed unmated and also that it refused to mate with the *H. flavipes*. In February I put it with a pale male *H. obscurus* from Wytham Wood and subsequent eggs hatched, giving a mixture of pale and dark offspring, thus confirming the dominance of the pale form (Angus 1977).

H. strigifrons also has a pale form, which I first took (two males) near Burgh by Sands, Cumbria in September 1966 (Plate 2 **j**) and of which I received from Garth Foster a living female taken at Blackboys, Sussex in April 1967 (Plate 2 **l**). As this was almost certainly already mated, I put it in an aquarium where it duly started laying fertilised eggs. I obtained about 20 adult offspring, all dark (Plate 2 **m**) and all died without breeding. Nevertheless, this suggests that the pale form is recessive as with the number of offspring obtained a heterozygous dominant would be expected to give a mixture of pale and dark offspring. The effects of crossing pale *H. obscurus* with dark *strigifrons* are discussed later.

Experimental hybridisation of different species

I succeeded in hybridising female *H. flavipes* with male *obscurus* and female *H. strigifrons* with both *H. obscurus* and *H. flavipes*. When discussing experimental crosses in the lab. it is normal to write the female parent first, the rationale being that this would be the one whose involvement was more certain! In labelling the hybrids I used the letter w for *H. obscurus* as at that time the species was known as *H. walkeri* Sharp. So, the hybrids were labelled f/w, s/w, s/w(p) (where pale *H. obscurus* was used) and s/f. Male hybrids were numbered so that the ownership of aedeagi was not lost when they were slide-mounted for photography.

The experiments began in October 1966 with the setting up of potential parent species in breeding aquaria to obtain known unmated stock. The *H. flavipes* was from the Sway Ponds area of the New Forest, the *obscurus* from Oxford and the *strigifrons* from Moccas Park. The *H. obscurus* and *strigifrons* soon laid eggs and F1 adults were obtained. However, the *H. flavipes* died without breeding, and had to be replaced in early December. I had a moped, but early December was too cold for this and I was “rescued” by Professor Mike Hassell, then a postgrad in the Hope Department of Entomology, who took me down to the New Forest in his car. It was very difficult to obtain specimens but by bringing a sizeable bag of aquatic vegetation home I obtained a small number of *flavipes*, which bred successfully. So, very many thanks Mike for putting the show back on the road!

H. flavipes* X *obscurus

This was obtained once, in June 1967, using a female *H. flavipes* from the New Forest stock and a dark Oxford *obscurus*. These were the only relevant specimens I had managed to keep alive during the five months they took to mature their gonads. Adult beetles are shown in Plate 3 **b–d** and aedeagi in Plate 5 **l n**, with a graph of aedeagus length against beetle length shown in Plate 6. The general appearance of *H. flavipes* and *obscurus* is, as is well-known, very similar, with the main differences being the less angled submedian grooves of the pronotum and more tapering elytral apex in *flavipes*. The *H. flavipes* female parent is shown in Plate 3 **a**, while *obscurus* adults are shown in Plate 2 **h i**. The hybrids have the pronotal grooves more as in the *H. flavipes*, but the difference in elytral shape is scarcely apparent between any of the specimens. The aedeagi are very clearly more like that of *H. flavipes* than of *obscurus*, darker, with subapically sinuate outer margins to the parameres, and relatively longer basal pieces. The aedeagi of the three forms shown in Plate 5 **k–m** have been carefully printed at the same level of exposure and lighting, so their comparative darkness is shown accurately. The hybrid f/w8 shown in Plate 5 **n** has the shortest basal piece obtained experimentally. The *flavipes* aedeagus shown in Plate 5 **b** has the shortest basal piece encountered otherwise while the *obscurus* shown in Plate 5 **d** has by far the longest basal piece of any *obscurus* I have seen. *H. obscurus* normally has the outer margin of the parameres without any subapical sinuation. *H. subarcuatus* Rey and *algericus* Motschulsky, which have subapical sinuation of the parameres, were considered to be subspecies of *obscurus* in 1970, but have since been shown to be separate species (Angus 1996). However, Foster *et al.* (2014) figure a *H. obscurus* aedeagus with a distinct subapical sinuation. This is an Italian specimen, from the Macarese district near Rome. I have seen this specimen, mounted in a shallow drop of DMHF on a card and while it is possible that the sinuation may appear slightly exaggerated by shrinkage of the DMHF, it is certainly present. I have two specimens which I collected in this area and they have no trace of a sinuation. It seems best to regard the sinuation shown by Garth’s specimen as exceptional, like the long basal piece of my specimen seen in Plate 5 **d**.

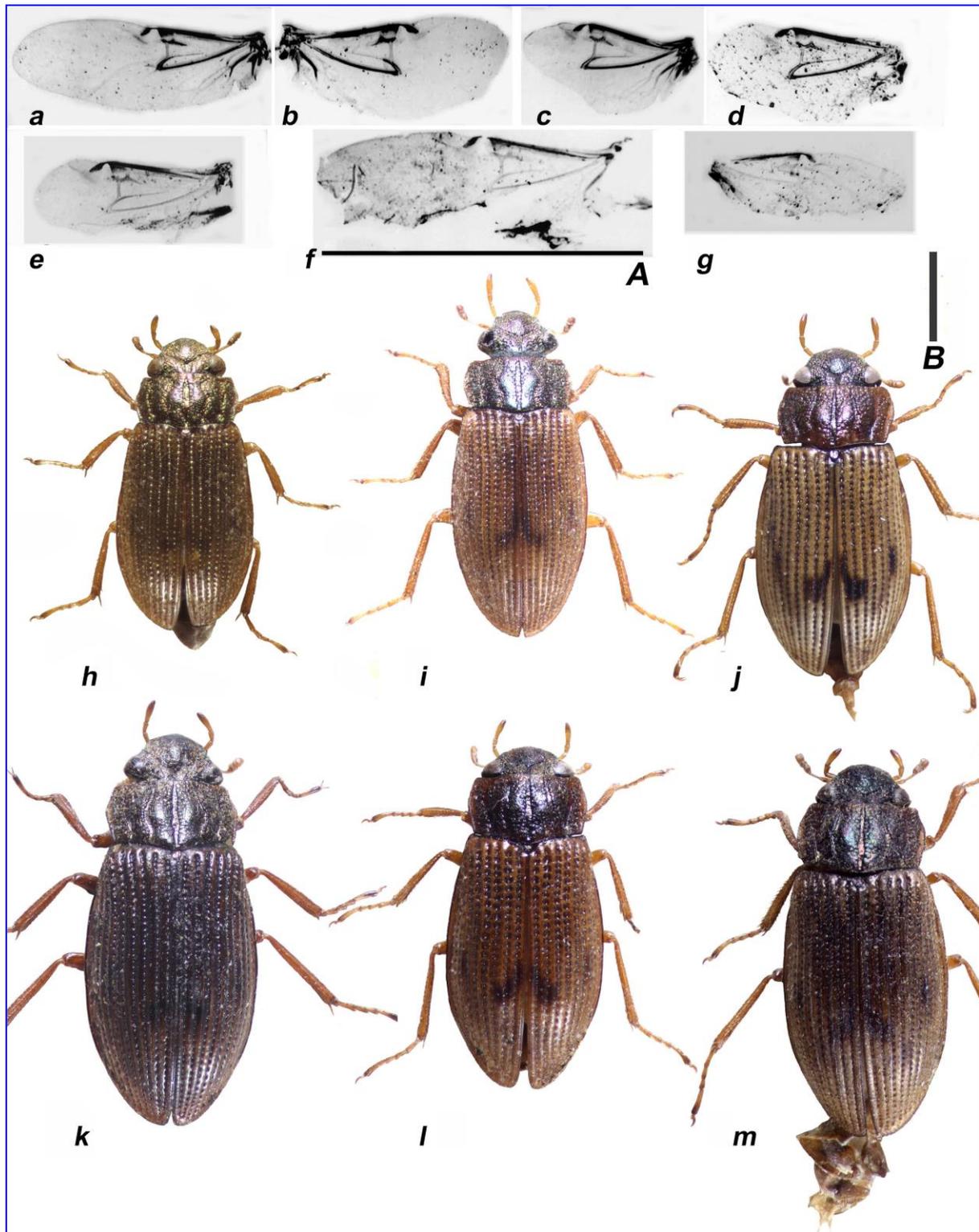


Plate 2 Experiments involving crosses of varieties within species. **a–g** wings of macropterous and brachypterous *H. granularis*. **a** macropterous, **b** brachypterous from Otmoor, Oxford; **c** brachypterous from the New Forest; **d** brachypterous, lab. reared from Sussex stock; **e – g** offspring of a cross between the female shown in **d** and macropterous males from Otmoor, **e** brachypterous, **f g** macropterous, **g** a very stunted specimen. **h–m** adult beetles. **h** *H. obscurus*, normal dark form reared from F1 pale X pale from Wytham Wood; **i** *H. obscurus*, pale form, lab. reared from Wytham Wood stock; **j** *H. strigifrons*, pale ♂ from Burgh-by-Sands, Cumbria; **k** dark *H. strigifrons* from Moccas Park, Herefordshire; **l** pale *H. strigifrons*, ♀ from Blackboys, Sussex; **m** dark *H. strigifrons* reared from the pale ♀ shown in **l**. Scale A = 10 mm for **a–g** scale B = 1 mm for **h–m**

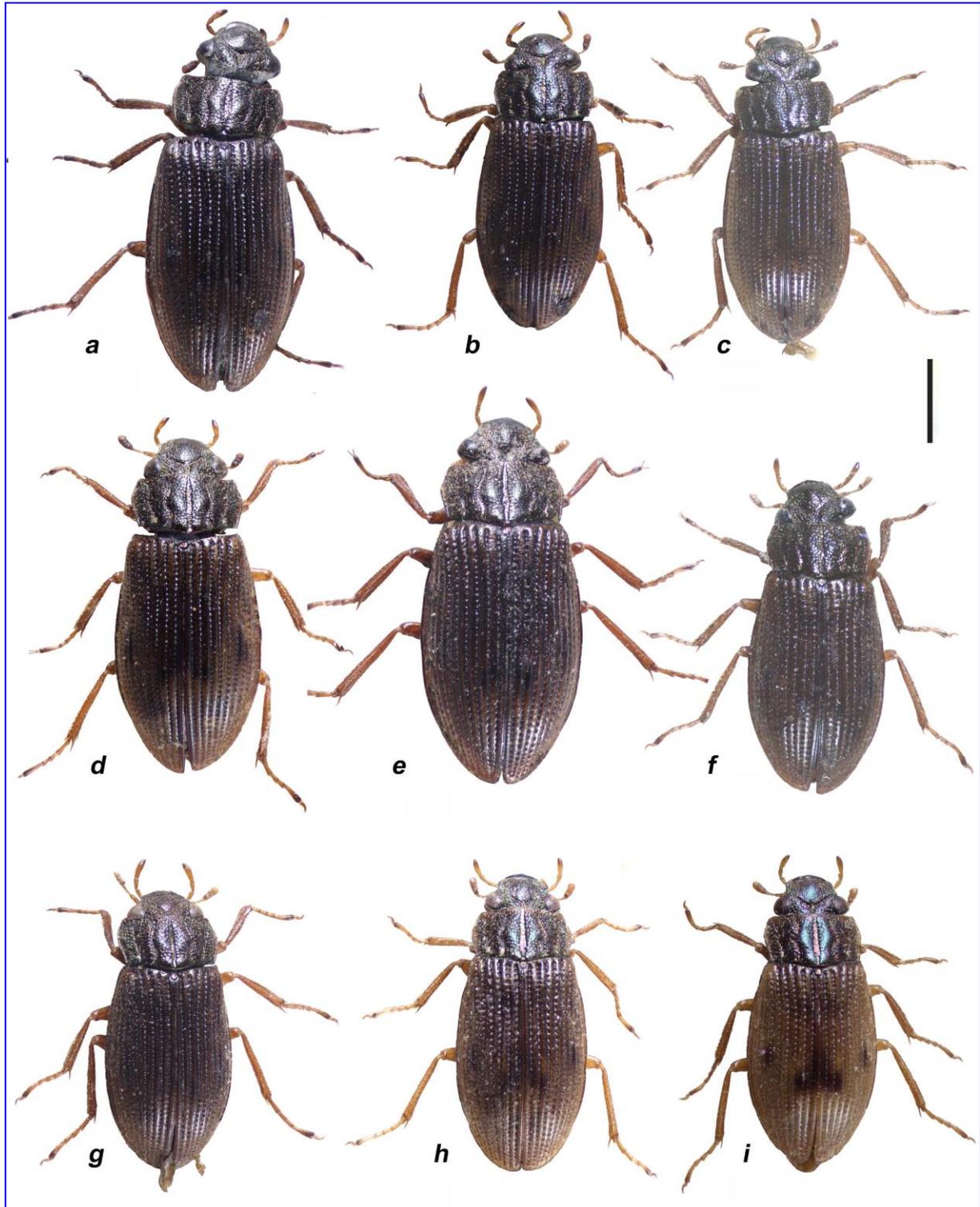


Plate 3 Interspecies hybridisation experiments involving ♂ *H. obscurus*, adult beetles. **a** *H. flavipes* from the New Forest, mother of hybrids with *H. obscurus*; **b–d** *H. flavipes* X *obscurus* hybrids, **b** f/w 7, **c** f/w 8, **d** f/w ♀; **e** *H. strigifrons* from Moccas Park, mother of hybrids with *H. obscurus*; **f–i**, *H. strigifrons* X *H. obscurus* hybrids, **f** s/w 5, **g** s/w 9, **h** s/w(p) ♀, **i** s/w(p) ♀. Scale = 1 mm

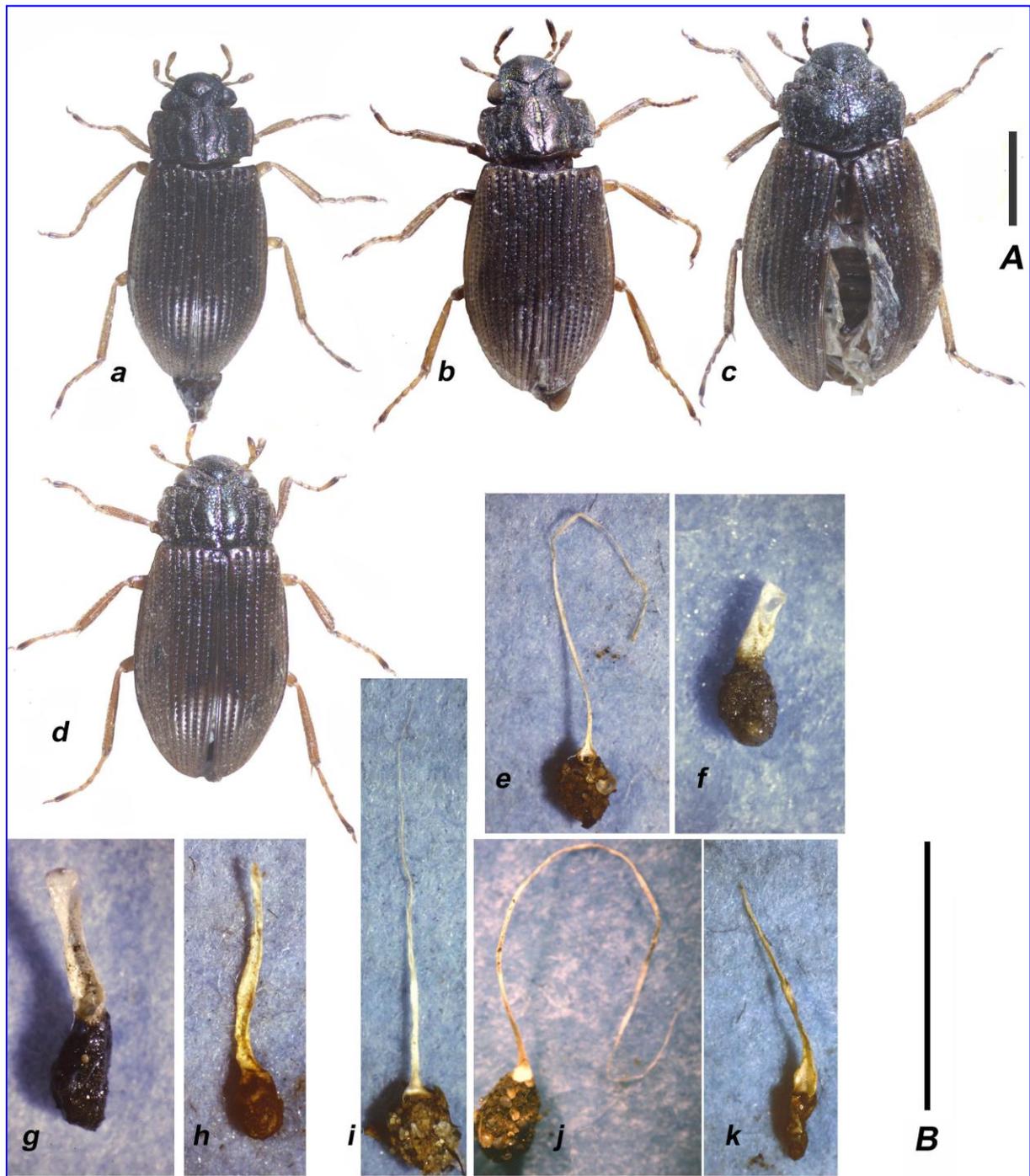


Plate 4 a – d Interspecies hybridisation experiments involving ♀ *H. strigifrons* and ♂ *H. flavipes*, adult beetles. **a** s/f 3, **b** s/f 2, **c** s/f ♀, **d** s/f 4 ; **e–k** egg cocoons; **e** *H. minutus*, **f** *H. griseus*, both from Water Eaton, Oxford; **g** *H. strigifrons* from Moccas Park; **h** *H. strigifrons* X *H. obscurus*; **i** *H. flavipes* from the New Forest; **j** *H. obscurus* from Oxford; **k** *H. flavipes* X *H. obscurus*. Scale **A** = 1 mm for **a–d**, scale **B** = 5 mm for **e–k**

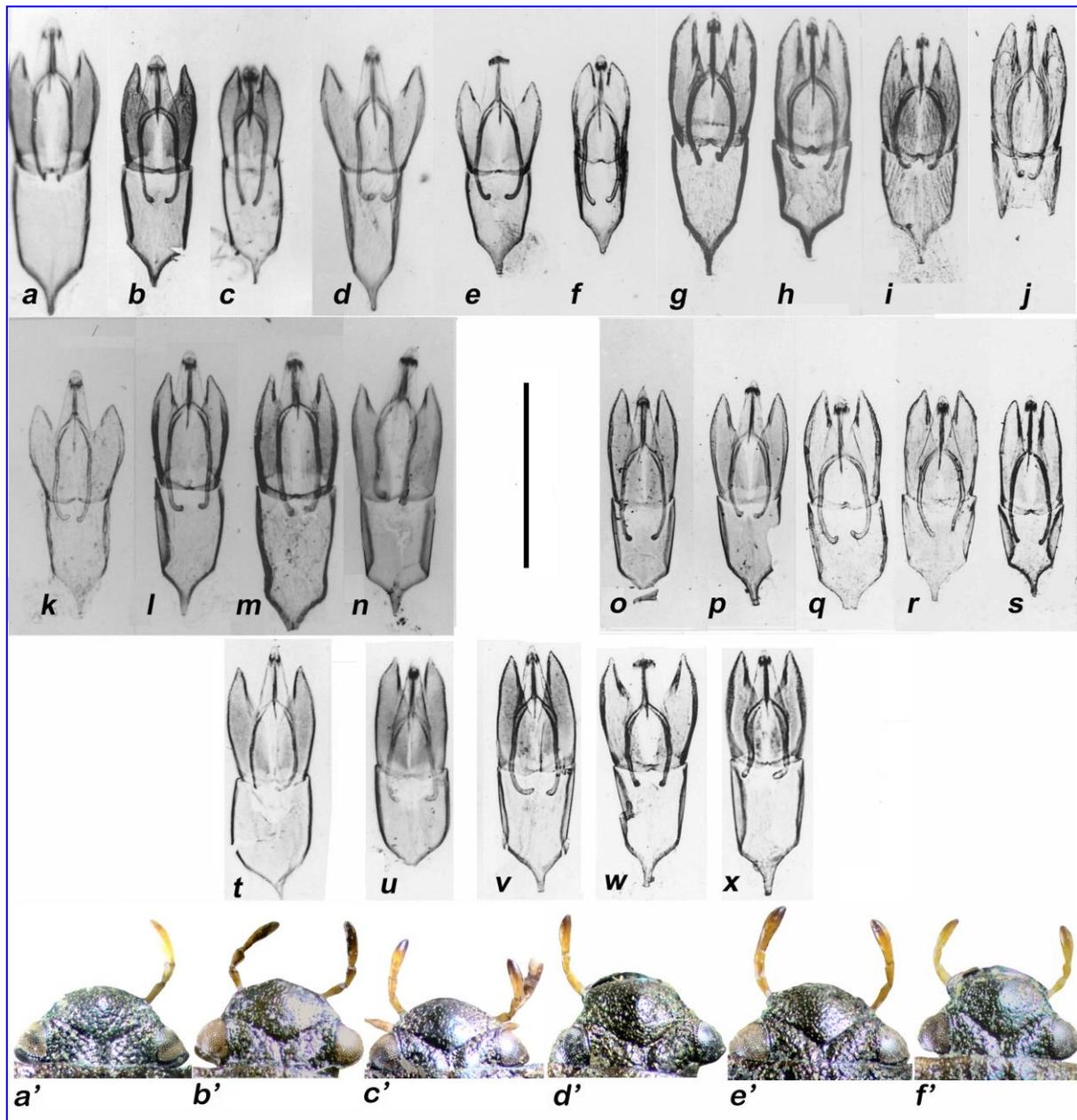


Plate 5 a–x aedeagi a'–f' heads. a–c *H. flavipes*; a from the New Forest, b from Parikkala, Finland, with a relatively short basal piece, c coll. Sharp a small specimen from the Escorial, Spain. d–f *H. obscurus*, d from a fen at the southern end of L. Windermere, with an exceptionally long basal piece, e *H. obscurus* Neotype, f *H. walkeri* Lectotype. g–j *H. strigifrons*, g h from Tulloch, Inverness-shire; i from near Oulu, Finland; j from Moccas Park; k–m *H. obscurus*, hybrid and *flavipes* printed to show accurately the relative darkening, k *H. obscurus*, l f/w 7, m *H. flavipes* from the New Forest. n hybrid f/w 8 with a relatively short basal piece. o–s *H. strigifrons* X *obscurus* hybrids, o s/w 8, p s/w 6, q s/w 9, r s/w(p) 3, s s/w(p) 1. t–x *H. strigifrons* X *flavipes* hybrids, t s/f 1, u s/f 2, v s/f 3, w s/f 4, x s/f (beetle lost). a' *H. strigifrons*, Oulu, Finland; b' s/f 2; c' s/f 4; d' s/w 5; e' s/w 9; f' s/w(p) ♀. Scale = 0.5 mm for a–x, 1 mm for a'–f'

I think that if hybrid specimens were to be taken they would almost certainly not be recognised as such, but passed as *flavipes*. However, when aedeagus length is plotted against beetle length (Plate 5 **y**) the aedeagus length of the hybrids is seen to be just below that of *flavipes* of the same beetle length. A few of the hybrids were killed and dissected as soon as they had matured, but most were kept together in an aquarium to see if they would produce offspring. After four months egg cocoons began to be produced, often with only a very few eggs, none of which showed any embryonic development. Egg cocoons of *H. flavipes* and *obscurus* are shown in Plate 4 **i j**. The cocoons of the two species are of similar form, with trailing ribbon- or threadlike masts, these masts tending to be longer in *H. obscurus*. The cocoon of an f/w hybrid is shown in Plate 4 **k**. Its most striking feature is the very small egg bag, associated with the low number of eggs produced. It is clear that these hybrids are unable to breed among themselves. It is perhaps unfortunate that I did not attempt to back-cross the hybrids to either of the parent species – it is likely that I did not have suitable material available at the time, but I have no records of this. It may also be noted that Angus (1996) has shown that *H. flavipes* and *obscurus* have different chromosomes, so that hybrids would almost certainly be sterile in back-crosses as well as among themselves.

H. strigifrons* X *obscurus

This cross was obtained three times, twice in June 1967, using female *H. strigifrons* reared from material taken at Moccas Park in October 1966 and the same male *obscurus* which fathered the f/w hybrids and once in June 1968, again using a female *H. strigifrons* reared from Moccas Park stock taken in April 1968 but this time with a pale male *H. obscurus* reared from Wytham Wood stock taken in July 1967. These two species are clearly more different morphologically than are *H. flavipes* and *obscurus*, so a morphological analysis of the hybrids is more fruitful. As with the f/w hybrids, aedeagal characters are considered first.

H. obscurus aedeagi are shown in Plate 5 **d–f**, and *strigifrons* aedeagi in **g–j**. In *obscurus* the struts are relatively longer and more or less parallel to one another over much of their length, whereas in *strigifrons* they are shorter and evenly curved, so the tube and struts together have the outline of a pair of narrow-nosed pliers. The parameres of *H. strigifrons* are longer than those of *obscurus* and their outer margins may be either bluntly angled inwards subapically (Plate 5 **g h**) or evenly curved (Plate 5 **i j**). The aedeagi of the hybrids (Plate 5 **o–s**) are variable. The struts may be distinctly long (**o s**) or shorter and evenly curved (**r**). The outer margins of the parameres may be evenly curved (**o–q s**) or with the blunt subapical angle (**r**).

The somatic features of the hybrids differ markedly between the families. The first family gave only two offspring, a male which failed to complete its ecdysis from the pupa and a female. The second family gave about 40 adult offspring despite about 60% larval mortality. Some specimens were killed and mounted once they were fully hardened, while the rest were put in an aquarium in the hope of their breeding among themselves. The hybrids from these families have the stem of the Y-groove on the head narrow-linear, as in *strigifrons* (Plate 5 **a' d' e'**) and pronotal sides evenly rounded throughout their lengths (Plate 3 **f g**). The elytral flanks, viewed from below, are broader than in *H. obscurus*, but not as wide as in *strigifrons*. The hybrids of the third family, fathered by the pale *obscurus* (Plate 3 **h i**), are distinctly different in appearance. They comprise four males and two females and are noticeably smaller than those of the first two families, length 2.9 – 3.7 mm, as against 3.3 – 3.8 mm. The stem of the Y-groove on the heads is expanded anteriorly (Plate 5 **f'**) and the sides of the pronotum were straighter posteriorly and less highly arched. In other words, the

heads and pronota are of the *obscurus* rather than the *strigifrons* pattern. The elytral flanks are similar to those of the first two families. Two of the six adults of this cross have the dark, slightly mottled elytra normal for both *H. obscurus* and *H. strigifrons* (Plate 3 **h**), but the other four have the elytra resembling a somewhat duller version of the pale *H. obscurus* pattern (Plate 3 **i**), with the dark sutural Λ -mark and dark spots on interstice 7 very distinct. In 1970 I referred to this spot as being on interstice 6, but that was because, following Sharp (1915), I numbered the interstices outwards starting with interstice 1 between striae 1 and 2, but current practice is to count the sutural interstice, between the suture and stria 1, as interstice 1. I was able to observe the development of the colour pattern of these pale beetles. In both *H. obscurus* and the paler hybrids, the dark marks are mid-brown after 12 hours while the rest of the elytra were pale cream. In pale *H. obscurus* and dark specimens of both it and the hybrids the final elytral colour was achieved after about 24 hours. However, in the paler hybrids, although the sequence of development of the elytral colour pattern was as in pale *obscurus*, the darkening of the ground colour continues for about three days. Thus, the dominant effect of the pale gene is reduced in the hybrids.

Most of the June 1967 hybrids were kept alive in the hope of breeding from them. Egg cocoons began to be produced in October 1967, the total number being about 20, only half the number obtained from the f/w hybrids, although there more s/w hybrids in the aquarium. Egg cocoons of *H. strigifrons*, hybrid s/w and *H. obscurus* are shown in Plate 4 **g h j**. The egg cocoon of the hybrid has the mast narrower than in *H. strigifrons*, but is still erect, not trailing as in *H. obscurus*. Note the small egg-bag of the hybrid cocoon compared with those of the parents. None of the eggs laid by the hybrids showed any embryonic development.

H. strigifrons* X *flavipes

I obtained this cross on two occasions, in December 1967 and again in September 1968. In both cases the female *H. strigifrons* were reared from Moccas Park stock and the male *flavipes* from the New Forest. However, the number of hybrids obtained was very low, only four adults, three males and a female from the first family, and a further four, two males and two females from the second. The first family consisted of two cocoons or eggs, giving about 12 larvae. Eight of these reached pupation, but only four reached the adult stage. The second family comprised one cocoon giving six larvae of which four survived to adulthood. In view of the small numbers of hybrids obtained, and their obvious sickliness no attempt was made to breed from them and analysis is on the morphology of these F1 adults.

Aedeagi of these species and their hybrids are shown in Plate 5 **a–c** are *H flavipes*, **g–j** *strigifrons* and **t–x** hybrids. The principal differences between the aedeagi of the two species are the longer more or less parallel struts of *flavipes* and its subapically sinuate parameres. Four of the five aedeagi show some subapical sinuation of the parameres, but one lacks any trace of this (Plate 5 **v**). The struts show some variation in length and also in a tendency to be parallel. In summary, these aedeagi would not pass for either *strigifrons* or *flavipes*, though they are more like *strigifrons*.

The differences in somatic characters between *H. strigifrons* and *flavipes* are similar to those between *strigifrons* and *obscurus*, except that the pronotal submedian grooves of *flavipes* are less angled outwards medially. The males of the first family (Plate 4 **a b**) have the stem of the cephalic Y-groove narrowly expanded anteriorly (Plate 5 **b'**) and the pronotum of the *flavipes* pattern, only weakly arched and with the sides straighter posteriorly. The female (Plate 4 **c**), although deformed, shows the pronotum very highly arched, more as in *H. laticollis* Thomson but it is

compressed longitudinally so that it is arched from front to back as well as laterally. The head groove is similar to those of the males. The elytral flanks are wide in all four specimens, though slightly narrower than in *strigifrons*. The two females of the second family are very similar to the males of the first one, but the males differ in having the pronotum highly arched and rounded at the sides (Plate 4 **d**), thus conforming to the *strigifrons* pattern but the stem of the cephalic Y-groove (Plate 5 **c'**) is expanded anteriorly, resembling that of *H. obscurus*. All these hybrids have the apical segment of the maxillary palpi elongate and with a narrow basal section, as in *H. strigifrons*. In summary, these hybrids are variable, indicating no general hybrid pattern and this, combined with their low survival rate, suggests serious genetic disruption.

Attempts at hybridisation resulting in convincing failure

All the hybridisation experiments described above involved rearing beetles and keeping the lab. reared stock alive for several months while their gonads matured and they came into breeding condition. In many cases beetles died in captivity and thus were unavailable for attempted hybridisation. This is why there were no attempted female *H. obscurus* crosses with either *flavipes* or *strigifrons*. The refusal of the Wyre Forest female pale *H. obscurus* to mate with male *flavipes* (though it later mated with male *obscurus*) has already been mentioned and suggests that female *obscurus* will not mate with male *flavipes*. However, the specimens used in this experiment were wild caught, which might have resulted in their having acquired their own species-specific mating requirements.

***H. sibiricus* Motschulsky X *H. aequalis* Thomson** A single female *H. sibiricus* brought back from Kevo, Finland in August 1967 began laying eggs in the laboratory in December. None showed any development, so it was concluded that this female was unmated. I therefore put a lab.-reared male *H. aequalis* with it. The female refused to mate and none of the eggs produced showed any development. A convincing refusal!

***H. minutus* F. X *H. griseus* Herbst** Both of these species began egg-laying in the laboratory from about two (*H. griseus*) to four (*H. minutus*) weeks after emerging as adults (Angus 1973) and so should be more amenable to hybridisation experiments. Angus (1970) mentions that attempting to mate a female *H. griseus* taken in the New Forest with male *H. minutus* resulted in eggs which showed no development, and eventual dissection of the female showed that it was unmated. In June 1969 I repeated and expanded these experiments, using lab.-reared material of both species, taken at Water Eaton, Oxford. (For a picture of this site, see Angus (2021). The egg cocoons of these species are very different from one another (Plate 4 **e f**), making them very easy to recognise in aquaria. Aquaria were set up with female *minutus* and male *griseus*, and female *griseus* and male *minutus*, several specimens of each in the aquaria. The control aquarium had males and females of both species. Numerous egg cocoons were laid in all the aquaria and while all the control cocoons gave eggs which hatched, none of the eggs from the hybridisation aquaria hatched. So, the refusal of these two species to hybridise is clear. It should be pointed out that this refusal to hybridise is not simply a feature of *H. minutus*. Thus, I have hybridised Spanish *H. lapponicus* Thomson females with male *minutus* from England and France, Siberian female *H. lapponicus* with Siberian *H. paraminutus* Angus males, and English female *minutus* with Austrian male *paraminutus*. In no case did these hybrids produce eggs with any significant embryonic development (Angus 1986). A similar result was obtained when hybridising English female *H. minutus* with male *calpensis* Angus from southern Spain (Angus 1988).

Discussion

Revisiting this work after more than 50 years is a curious experience. At the time of the work there was serious disagreement about the status of some of the forms regarded by Sharp (1915, 1916) as distinct species. Frank Balfour-Browne (1967 a, b, c) objected to species recognition being based on male genitalia and argued some of these “species” were merely environmentally induced variants. In particular, he regarded *H. fulgidicollis* (then known in Britain as *mulsanti*) as a saltmarsh induced form of *H. flavipes*. My experiments showed that rearing this species in the lab. in freshwater conditions did not lead to any transition to *flavipes*. These experiments can strike me as having some of the attributes of Don Quixote tilting at windmills, but, for me at least, they were necessary. When I went up to Oxford as a student and had access to Sharp’s (1916) aedeagus figures I was astounded that Balfour-Browne was prepared to regard species with such utterly different aedeagi as *fulgidicollis* and *flavipes* as being the same. However, I was puzzled and somewhat un-nerved by the fact that *H. flavipes* and *laticollis* Thomson appeared to have the same form of aedeagus. This problem was resolved by Kevan (1966) who drew attention to an inadvertent switch of aedeagus between a *laticollis* and a *flavipes*. This not only showed that *laticollis* and *flavipes* have very different aedeagi, but also explained Sharp’s almost incomprehensible *H. phalleterus*. My initially perplexing observations of swimming in *H. fulgidicollis* only made sense once its separate identity was appreciated. The aedeagal problem, however, comes back with the discovery that species of the *H. leontis* Angus group, clearly separable on morphological and chromosomal grounds, can have identical aedeagi. (Angus et al. 2005).

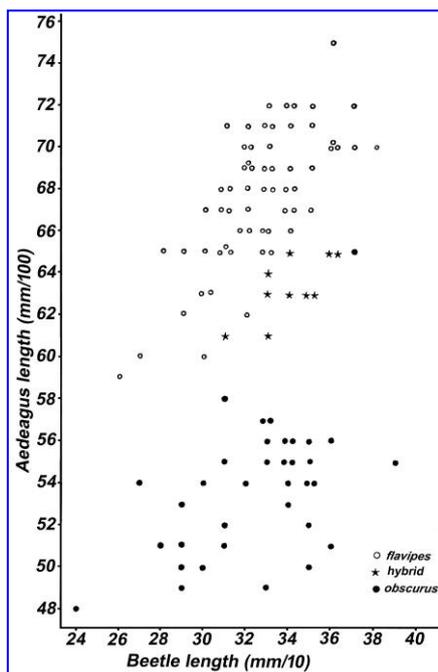


Plate 6 Graph showing aedeagus length against beetle length of *H. flavipes*, *obscurus* and f/w hybrids

Crowson (1981) in the Cytology and Genetics chapter of his *Biology of the Coleoptera* noted that the *Helophorus* I worked on were nearly all fully winged as well as relatively small and obscure-looking (this immediately after discussion of hybridisation in *Carabus*!), and that F1 hybrids were only obtained between very similar species whose status had been questioned. He particularly mentioned that *H. fulgidicollis* behaved as a very good species.

For me, a major breakthrough in my work on *Helophorus* taxonomy was the discovery that many of the species had different karyotypes, starting with the separation of *H. aequalis* and *H. aquaticus* (L.) (Angus 1982). Thus *H. flavipes* and *obscurus* have clearly different karyotypes (Angus 1996), and the karyotypes of *H. strigifrons* and *H. fulgidicollis* are also distinctively different (Angus 1989, 1986). Although these chromosomal differences at first appeared to be a “magic bullet” for establishing species limits, they too have their limitations, with some clearly distinct species having apparently identical karyotypes. An example is *H. fulgidicollis* and *H. asturiensis* Kuwert (Angus 1986). These

species are clearly separable on morphology, including the aedeagus, ecology and distribution.

Helophorus species are kind to the researcher in that their morphologies tend to be different (often subtly so), so at least the difficulties are apparent! My interest in *Helophorus* was sparked by discussions with Professor Frank Balfour-Browne. He was always helpful and informative – and a convincing exponent of his ideas! I remember being invited to dinner with him in London when I was not long into my research. I had photographs of the egg cocoons of *H. fulgidicollis* and *obscurus*, taken down a binocular microscope which we had not entirely “tamed”, so the photos appeared in circles surrounded by blackness – like pictures of red deer stags shown photographed “through a stalker’s telescope”. Somewhat apologetically I showed these to the Professor. He was completely unconcerned by their technical shortcomings, but fascinated by the information they gave. Then I showed him a photo of the aedeagus of the Fabrician type of *H. flavipes*. I prepared to duck, but no – he looked at it interestedly and said this was good but in his day people didn’t do it. A fantastic evening’s conversation! Sadly, his short-term memory had completely deserted him by this time (he was over 90) and the next (and last) time I met him he had completely forgotten. I felt crushed but now realise how fortunate I had been to have had the previous meeting.

Table 1 Localities for the material used

Locality	Latitude & Longitude	Species taken
Hampshire, E of Lymington	50.7545°N 1.5°W	<i>H. fulgidicollis</i> Motschulsky
Hampshire, New Forest, Sway	50.7963°N 1.596°W	<i>H. flavipes</i> Fab., <i>granularis</i> (L.)
East Sussex, Blackboys	50.9659°N 0.1779°E	<i>H. strigifrons</i> Thomson, <i>granularis</i>
Herefordshire, Moccas Park	52.0807°N 2.957°W	<i>H. strigifrons</i>
Berkshire, Wytham Wood	51.772°N 1.367°W	<i>H. obscurus</i> Mulsant
Oxfordshire, Water Eaton	51.8033°N 1.2520°W	<i>H. minutus</i> Fab., <i>griseus</i> Herbst, <i>obscurus</i>
Oxfordshire, Otmoor	51.507°N 1.188°W	<i>H. obscurus</i> , <i>granularis</i>
Oxfordshire, Stonesfield	51.856°N 1.445°W	<i>H. obscurus</i>
Worcestershire, Wyre Forest	52.396°N 2.346°W	<i>H. obscurus</i>
Glamorgan, Swansea, Llanrhidian saltmarsh	51.614°N 4.176°W	<i>H. fulgidicollis</i>
Westmorland, Walney Island saltmarsh	54.138°N 3.265°W	<i>H. fulgidicollis</i>
Westmorland, Lakeside on Windermere fen	54.274°N 2.957°W	<i>H. obscurus</i>
East Inverness-shire, Tulloch	57.235°N 3.685°W	<i>H. strigifrons</i>
Moray, Findhorn Bay saltmarsh	57.6445°N 3.6364°W	<i>H. fulgidicollis</i>
FRANCE, Camargue, near Étang de Vaccarès	43.464°N 4.453°W	<i>H. fulgidicollis</i>
FINLAND, Sa, Parikkala	61.544°N 29.487°E	<i>H. flavipes</i>
FINLAND, ObS, S of Oulu	61.832°N 24.85°E	<i>H. strigifrons</i>
FINLAND, Li, Kevo subarctic research station	69.760°N 26.290°E	<i>H. sibiricus</i> Motschulsky

Acknowledgements

My research was funded by the Science Research Council, whom I thank. I thank my research supervisor, Dr E. R. Creed for his support and guidance and Mr Jack Balfour-Browne for all his help and advice during my visits to the Natural History Museum in London. He was my External Examiner. I thank Peter Parks not only for his excellent photographs of egg cocoons but also for the interest and enthusiasm he showed when photographing them. The help from Prof. Mike Hassell in collecting *H. flavipes* in December has already been mentioned – its importance cannot be over-emphasised! Finally, I thank Prof. Garth Foster, not only for sending living material, but also for pleasant and informative discussions in the Natural History Museum, and for his company in the New Forest during a golden autumn day’s collecting, and the Natural History Museum for my continuing Scientific Associateship.

References

- ANGUS R B 1966. Observations on swimming and swimming hairs in *Helophorus* F. (Col., Hydrophilidae). *Entomologist's monthly Magazine* **102** 58 – 64.
- ANGUS R B 1969. Taxonomic, genetic and ecological Studies in *Helophorus* F. (Coleoptera, Hydrophilidae). *Oxford University D. Phil thesis*.
- ANGUS R B 1970. Genetic experiments on *Helophorus* F. (Coleoptera: Hydrophilidae). *Transactions of the Royal entomological Society of London* **122** 257 –276.
- ANGUS R B 1977. Pale *Helophorus obscurus* Muls. (Col., Hydrophilidae) in Worcestershire, with a note on its genetics. *Entomologist's monthly Magazine* **112** (1976) 201.
- ANGUS R B 1982. Separation of two species standing as *Helophorus aquaticus* (L.) (Coleoptera, Hydrophilidae) by banded chromosome analysis. *Systematic Entomology* **7** 265-281
- ANGUS R B 1986. Revision of the Palaearctic species of the *Helophorus minutus* group (Coleoptera: Hydrophilidae), with chromosome analysis and hybridization experiments. *Systematic Entomology* **11** 133 – 163.
- ANGUS R B 1988. A New Sibling Species of *Helophorus* F. (Coleoptera: Hydrophilidae) revealed by Chromosome Analysis and Hybridisation Experiments. *Aquatic Insects* **10** 171–183.
- ANGUS R B 1989. Towards an Atlas of *Helophorus* chromosomes. *Balfour-Browne Club Newsletter* **44** 13–22.
- ANGUS R B 1992. Insecta: Coleoptera: Hydrophilidae: Helophorinae. *Süßwasserfauna von Mitteleuropa* 20/10-2. Stuttgart: Gustav Fischer Verlag.
- ANGUS R B 1996. A re-evaluation of the *Helophorus flavipes* group of species (Coleoptera, Hydrophiloidea), based on chromosomal analysis, larvae and biology. *Nouvelle Revue d'Entomologie N.S.)* **13** 111–122.
- ANGUS R B 2021. *Helophorus lapponicus* revisited. *Latissimus* **49** 3–13.
- ANGUS R B, MAHDIZADEH S & HOSSEINIE S O 2005. A re-evaluation of the *Helophorus leontis* complex (Coleoptera: Helophoridae) based on chromosomal analysis, with description of *H. biltoni* sp. nov. from Iran. *Aquatic Insects* **27** 193–198.
- BALFOUR-BROWNE W A F 1958. *British Water Beetles* **3**. Ray Society, London.
- BALFOUR-BROWNE W A F 1967a. On a species-group of *Helophorus* Illiger (Col., Hydrophilidae). *Entomologist's monthly Magazine* **102** 265–269.
- BALFOUR-BROWNE W A F 1967b. Whole hoppers and hair splitters. *Entomologist's Record and Journal of Variation* **79** 199–201.
- BALFOUR-BROWNE W A F 1967c. Ecology versus Taxonomy. *Entomologist's Record and Journal of Variation* **79** 212–216.
- CROWSON RA 1981. *The Biology of the Coleoptera*. London: Academic Press.
- FOSTER G N, BILTON D T & FRIDAY L E 2014. Keys to adults of the water Beetles of Britain and Ireland (Part 2) (Coleoptera: Polyphaga: Hydrophiloidea – both aquatic and terrestrial species). *Handbooks for the Identification of British Insects* **4** (5b). St Albans: Royal Entomological Society.
- KEVAN D K 1966. The British species of the genus *Helophorus* Illiger, subgenus *Helophorus* s. str. (Col., Hydrophilidae). *Entomologist's monthly Magazine* **101** 254–268.
- SHARP D 1914. A new species of *Helophorus*. *Entomologist's monthly Magazine* **50** 103–104.
- SHARP D 1915. Studies in Helophorini. 3 Remarks on some systematic characters. *Entomologist's monthly Magazine* **51** 113–118.
- SHARP D 1916. Studies in Helophorini. 10 – *Helophorus* (continued). *Entomologist's monthly Magazine* **52** 108–112, 125–130, 164–177.

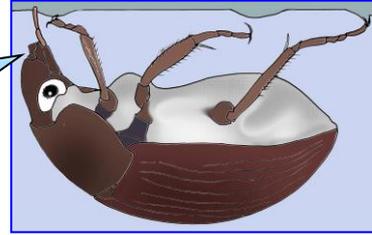
Postscript The original *Trans. R. Ent. Soc.* paper long predates PDFs, and the 25 free reprints are long ago dispersed! However, I have created a pdf from my own paper copy. The printed illustrations, though excellent in the publication, have come out badly in the pdf, so I have appended the same illustrations as photographs from my D. Phil. thesis. I can supply copies of this pdf to anyone wanting one. RBA.

Received August 2021

WALKING UNDER WATER

Ralph Atherton drew attention to an article in the *i* newspaper “Beetle that walks on water... upside down”. This was discovered by someone working on a PhD on a frog. The newspaper says “It is the first time such behaviour has been witnessed. Researchers believe the quarter-inch (6mm) insect belongs to the Hydrophilidae....”

Hey, I'm sure I just saw that frog jump



Hang on a minute. The first time? An unnamed beetle? As everyone knows who reads this newsletter, when a hydrophilid is forced to let go of vegetation below the water, it bobs up to the surface and often walks upside down. The original paper claims that the associated video of walking upside down is a first, but yes, we really do have a paper in which no-one has troubled to find out the name of the beetle and even shown some hesitancy as to the family to which it might belong. So much for ethology and *Ethology*. Research by David Hu and John Bush on walking on water is currently to do with the fluid mechanics of walking the right way up in the air. Clearly, some research is needed into how the surface tensions are manipulated to permit walking *beneath* the water. Full marks to the authors for drawing attention to the phenomenon.

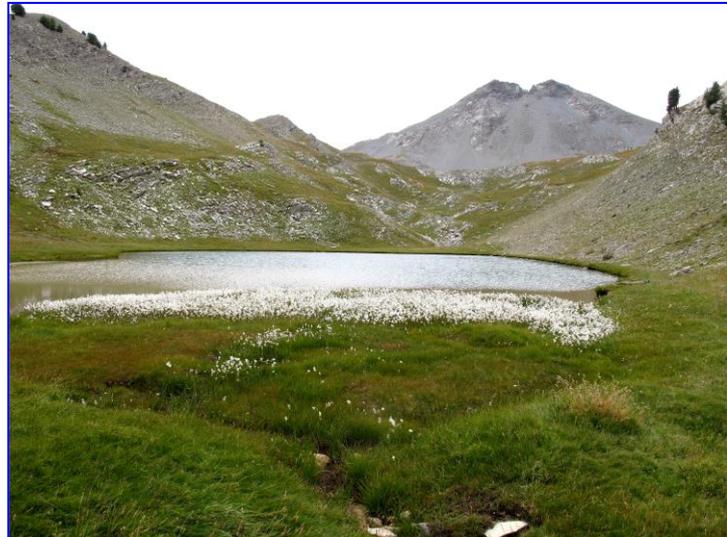
GOULD J & VALDEZ J W 2021. Locomotion with a twist: aquatic beetle walks upside down on the underside of the water's surface. *Ethology* **127** 669-673.

HU D L & BUSH W M 2010. The hydrodynamics of water-walking arthropods. *Journal of Fluid Mechanics* **644** 5-33.

BUSH W M & HU D L 2006 Walking on water: biolocomotion at the interface. *Annual Review of Fluid Mechanics* **38** 339-369.

FRENCH ALPS

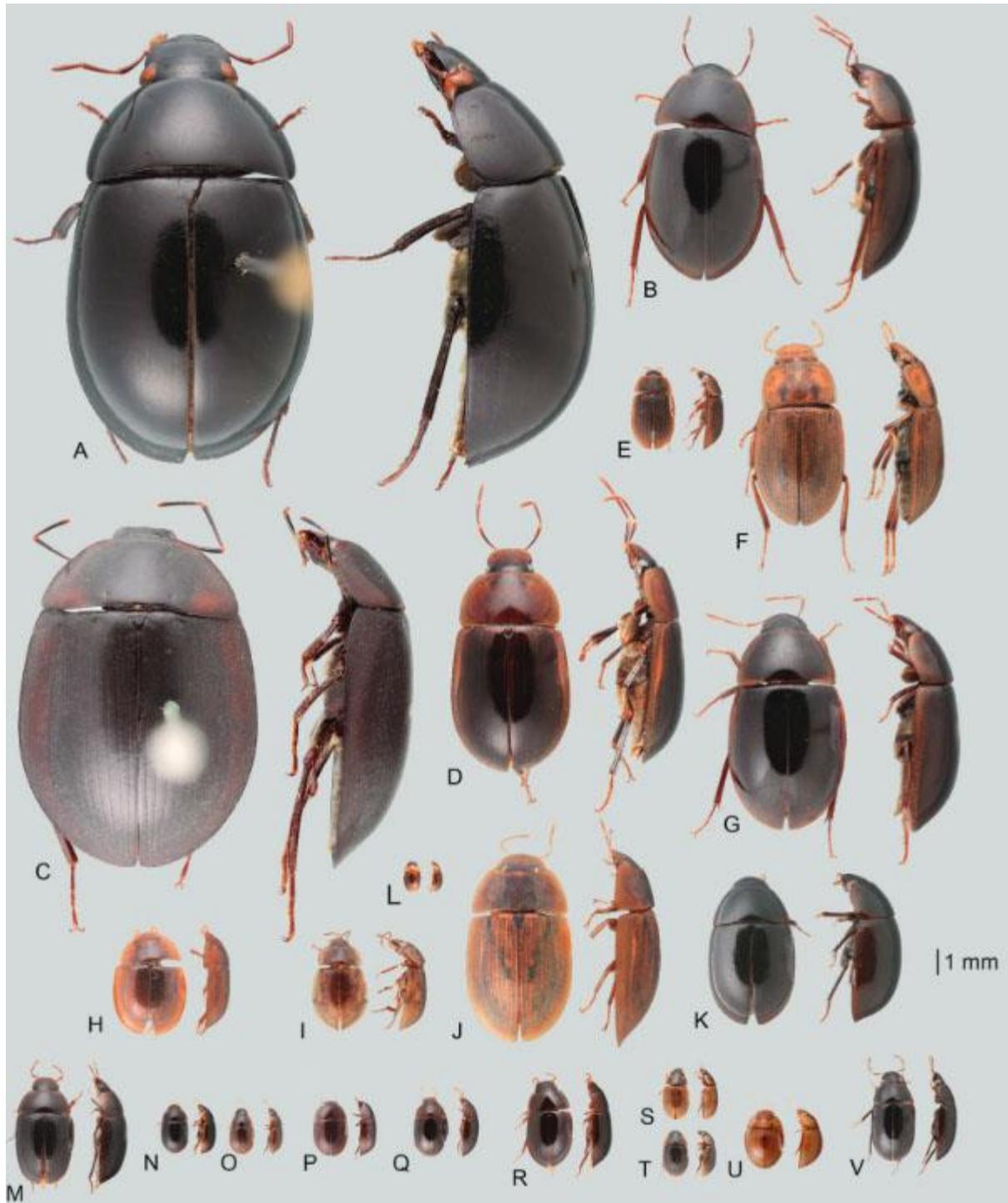
This is the fourth paper on the water beetles of the Mercantour National Park. Earlier ones were also in *Le Coléptériste* (**17** 93-109; **21** 10-14; **22** 34-39). Ten new species were found in 2019:- *Gyrinus urinator* Illiger, *Haliphus mucronatus* Stephens, *Agabus brunneus* (Fab.), *Dytiscus pisanus* Laporte de Castelnau, *Graptodytes ignotus* (Mulsant & Rey), *Hydroporus pubescens* (Gyllenhal), *Laccobius gracilis gracilis*



Motschulsky, *Coelostoma orbiculare* (Fab.), *Hydraena angulosa* Mulsant, and *Hydrocyphon deflexicollis* (Müller). The site is at l'Encombrette at 2,334 metres above sea level, with *Hydroporus foveolatus* Heer and *Helophorus glacialis* Villa & Villa.

QUENEY P 2021. Coléoptères aquatiques du massif du Mercantour: données complémentaires pour huit communes des Alpes-Maritimes et des Alpes-de-Haute-Provence (France). *Le Coléptériste* **24** 40-45.

ACIDOCERINAE CATALOGUE



This follow-up to the review of Acidocerinae (see *Latissimus* 49 22) demonstrates the gritty detailed work needed to substantiate what are now fundamentally genetic analyses. Twenty-three extant genera are recognised including the new and well-named African *Colossochares* (A on the figure) and the Neotropical *Novochares* (G) as separate from the newly defined *Helochares*. The catalogue's Figure 1 demonstrates the relative uniformity of body form in conjunction with great size variation ranging from *Colossochares* to *Nanosaphes* (L).

GIRÓN J C & SHORT A E Z 2021. The Acidocerinae (Coleoptera. Hydrophilidae): taxonomy, classification, and catalog of species. *ZooKeys* 1045 1-236.

TROUT DIET - AN APPARENTLY OVERLOOKED STUDY BY DAVID SHARP

This obscure publication might reasonably have attracted more attention and perhaps a joint authorship with David Sharp, given the amount of work it must have entailed. The fish concerned was a brown trout (*Salmo trutta* L.) taken from the “Torquay reservoirs, near Lustleigh”, presumably the reservoirs at SD8082 and nearby in South Devon. Sharp reported 46 insect taxa from a single fish, mostly beetles but only a few aquatic. These were *Stictotarsus duodecimpustulatus* (De Geer), *Nebrioporus elegans* (Panzer) and *Haliphus “lineatus”*, presumably a misunderstanding on Perkins’ part of *H. lineatocollis* (Marsham). There must be some comment on the beetle finds from Sharp in one of his own papers, but it has yet to be found. Thanks go to Rob Close for drawing attention to this paper.

PERKINS R C L 1926. A trout’s diet. *Torquay Natural History Society, Journal of Transactions and Proceedings for the years 1922-6* 415-21.

COPELATUS IN SABA

Google will tell you that the Dutch Caribbean comprises the constituent countries of Aruba, Curaçao and Sint Maarten, and the special municipalities of Bonaire, Sint Eustatius and Saba. Saba is 13 km² of volcanic stub in the Lesser Antilles. *Copelatus posticatus* (Fab.) was found in Saba Lake on Mount Scenery, a bonus during a hunt for water fleas.

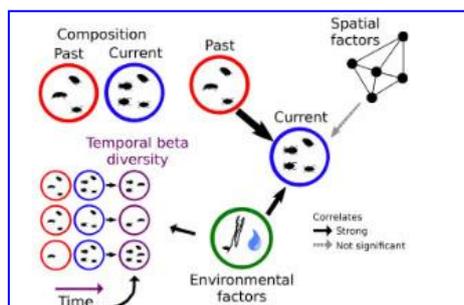
SOESBERGEN M & HAKKAART Q 2021. De waterroofkever *Copelatus posticatus* op Saba gevonden (Coleoptera: Dytiscidae: Copelatinae). *Entomologische berichten* **81** 114-116.

COPELATUS IN CUBA

This *Copelatus* brings the Cuban *Copelatus* count to ten. It was caught in a light trap on Isle de La Juventud in 2016. It belongs to the nominate subspecies as opposed to *C. chevrolati renovatus* (Guignot). The correspondent is Lars Hendrich.

MEGNA Y S, BALKE M & HENDRICH L 2021. First record of the diving beetle *Copelatus chevrolati* Aubé, 1838 in Cuba (Coleoptera, Dytiscidae, Copelatinae). *Check List* **17** 1291-1294.

KALMAR VS ÖLAND



Water beetles were sampled for eighteen years in twenty sites on Öland and twenty-one on the facing Swedish mainland. The past water beetle community structure explained the current structure better than environmental and spatial variables. Changes in diversity were associated more with gains than losses. Hydroperiod, habitat size, hydrology and time between sampling events explained part of differences in diversity. Looking

more widely at previous studies attempting to explain differences in diversity using ecological factors such as water body size, permanence, shore slope and flow it seems that such factors could also be correlated with community changes over time. The area of Öland includes the alvar, a limestone made famous by Nils Bruce in 1964, and reworked by the Balfour-Browne Club in 2011 (*Latissimus* **30** 32-33).

ORTEGA J C G, GEIJER J, BERGSTEN J, HEINO J, HERRMANN J, JOHANSSON F & BINI L M 2021. Spatio-temporal variation in water beetle assemblages across temperate freshwater ecosystems. *Science of the Total Environment* **792** 148071 1-11.

HYDROVATUS IN TAIWAN

Eight species of *Hydrovatus* are now known from Taiwan, bringing the total known dytiscid species there to 68. *H. subrotundatus* was found amongst algae in the edge of a field planted with Taro, *Colocasia esculenta* (L.) on Orchid Island. The correspondent is Lars Hendrich.

WANG L-J, HENDRICH L & BALKE M 2021. First records of the diving beetles *Hydrovatus subrotundatus* Motschulsky, 1859 and *Hydrovatus pudicus* (Clark, 1863) in Taiwan (Coleoptera, Dytiscidae, Hydroporinae, Hydrovatini). *Check List* **17** 1295-1298.

NORFOLK NOISES

The paper by Jack Greenhalgh *et al.* opens up so many possibilities. It is based on two investigations. In the first daytime sound recordings were made for ten minutes in Norfolk ponds of two types, one overgrown and the other restored with an open canopy. The Pond Acoustic Sampling Scheme protocol is described in full by Carlos Abrahams *et al.* The soundscape biodiversity based on six acoustic indices was higher in the restored ponds than in the unmanaged ones. Sound production was investigated for isolated specimens of *Acilius sulcatus* (L.), *Rhantus suturalis* (Macleay) and *Hyphydrus ovatus* (L.) in the laboratory. The signals produced differed markedly between species. Perhaps what we now need is some guidance on the extent to which these noises change when the beetles come together, and as some sort of control we need the noise made by the real Norfolk rarities of the Brecks and Broads.

ABRAHAM C, DESJONQUÈRES C & GREENHAGH J 2021. Pond acoustic sampling scheme: a draft protocol for rapid acoustic data collection in small waterbodies. *Ecology & Evolution* **11** currently paginated 1-12.

GREENHALGH J A, STONE H J R, FISHER T & SAYER C D 2021. Ecoacoustics as a novel tool for assessing pond restoration success: Results of a pilot study. *Aquatic Conservation: Marine and Freshwater Ecosystems* probably **31**, currently paginated 1-12.

NEW RECORDS FROM FLORENCE

This continued cataloguing of Nino Sanfilippo's collection includes *Ilybius fuliginosus fuliginosus* (Fab.) new for Corsica, *Bidessus coxalis* Sharp new for the Balearics in Mallorca, *Graptodytes pictus* (Fab.) new for the Czech Republic, *Graptodytes veterator veterator* (Zimmermann) new for Albania, *Helophorus obscurus* Mulsant and *Helochares obscurus* (Müller) new for Bosnia-Herzegovina, plus numerous new regional records for Italy.

ROCCHI S & POGGI R 2021. Nuove segnalazioni faunistiche di coleotteri acquatici paleartici dell collezione Nino Sanfilippo conservata nel Museo Civico di Storia Naturale "Giacomo Doria" di Genova. (Coleoptera, Haliplidae, Dytiscidae, Helophoridae, Hydrophilidae, Hydraenidae, Limnichidae, Heteroceridae). *Doriana, Annali del Museo civico di Storia Naturale "G. Doria"* **9** (415) 1-8.

LOMBARDY LIST

This survey of Monte Netto, Brescia, has produced 59 species. New records for the province are for *Agabus nebulosus* (Forster), *Georissus crenulatus* (Rossi), *Berosus frontifoveatus* Kuwert, *Cercyon analis* (Paykull), *Limnebius atomus* (Duftschmid), *Prionocyphon serricornis* (Müller), *Contacyphon laevipennis* (Tournier and *C. padi* (L.). The Brescian list now runs to 205 species. The correspondent is Mario Toledo.

MOLA L & TOLEDO M 2021. Contributo alla conoscenza della coleotterofauna del Monte Netto (Lombardia, provincia di Brescia). I. Coleotterofauna acquatica (Coleoptera: Haliplidae, Noteridae, Dytiscidae, Helophoridae, Hydrochidae, Georissidae, Hydrophilidae, Hydraenidae, Heteroceridae, Dryopidae, Elmidae, Scirtidae). *Studi Trentini di Scienze Naturali* **11** 61-72.

THE WEALDEN TRIANGLE

Ron Carr

The Weald of Kent in south-east England contains hundreds of small to medium-sized ponds that are mainly though not exclusively concentrated in Ordnance Survey (OS) grid squares TQ83, TQ84, TQ93 and TQ94 (OS Land Ranger map **188**: Maidstone and Tunbridge Wells and **185**: Ashford and Romney Marsh). At first appearance the ponds could be mistaken for flooded periglacial hollows resembling the pingo or palsa-like formations that represent the edge of the Weichselian ice sheet in Norfolk, however the maximum extent of ice advance in England extended no further south than the River Thames (Jones 1981) and consequently all permanent lentic water bodies in southeast England are man-made (Carr 1986).

The Wealden ponds pre-date the commencement of OS mapping during the latter part of the 19th century and are likely to have been excavated for various purposes. Larger ponds are probably as a result of the quarrying of iron-bearing nodules from the Weald Clay during the time of the Wealden iron industry, though these were more abundant in exposures of Wadhurst Clay that occur more widely in the neighbouring county of East Sussex. The ponds are not to be confused with furnace and hammer ponds, which were formed by the damming of streams in order to provide water power to drive the bellows of blast furnaces (Straker 1931). Smaller ponds were most likely excavated in order to provide watering for cattle and sheep and also for clay extraction to support brick and pottery manufacture in the local area. The 1897 OS map extract (Fig 1) depicts a small pottery located about 1.7km to the north of the village of High Halden, with an adjacent terrace (presumably for workers at the pottery) and surrounded by a number of ponds. Although the pottery no longer exists and several of the ponds have been infilled, evidence of its former presence persists in the names of nearby Potkiln Farm and Potteries Farm.

In contrast to much of the county, the Weald of Kent is lightly populated and much of the land remains as sheep farming with limited areas of arable cultivation. The ponds are all located on private land and are consequently difficult to access without the troublesome procedure of ascertaining ownership in order to gain permission to collect. A number can however be accessed from adjacent public footpaths. Due to private ownership, the ponds are generally un-managed and are in jeopardy of being infilled or left to dry out as a result of becoming over-vegetated.

Although the aquatic beetles of Kent had been historically recorded (e.g. Woodcock 1944) the efforts of collectors had been largely confined to coastal marshes to the north and Romney Marsh to the south. Following the interest in water beetles that I had acquired during the late 1970s frequent visits were made inland so as to promote a more complete coverage of the Kent fauna (Carr & Philp 1988). This included collecting from the Wealden ponds when the opportunity arose. The ponds were generally found to support a variety of well-distributed lowland beetles with the occasional occurrence of local species such as *Peltodytes caesus* (Duftschmid) and *Dytiscus dimidiatus* Bergsträsser, which are more typical of the coastal marshes. The Wealden ponds were therefore considered to provide a useful link to enable the dispersal and distribution of species from less vulnerable habitats.

Some forty years later, fourteen ponds were visited during the latter part of 2020 in order to ascertain their condition and whether they remain as abundant. The area specifically targeted was where the greatest concentration of ponds are denoted, an area roughly the shape of an isosceles triangle bounded by the Tonbridge to Ashford railway to the north, the A28 road to the south and the A274 road to the west. Several of the ponds had been visited in the past. Little change appeared to have occurred in the local area during the time that had elapsed, most of the land having

remained as grazing for sheep with localised areas of arable farming. The majority of ponds appeared to remain, though generally in various stages of deterioration.

The larger ponds mostly contained much leaf litter and no emergent vegetation, being heavily shaded by mature oak *Quercus* and willow *Salix*. Such waterbodies typically contained an impoverished fauna of beetles. Many of the smaller ponds had either partially or completely dried out, partly due to an exceptionally dry spring though largely as a result of *Salix* invasion (Fig 2). The margins of others had been heavily trampled by sheep. Though partly overgrown with *Salix*, the most productive pond proved to be the first one visited near Bethersden village (TQ924407) which had retained an exposed margin supporting a variety of vegetation including *Alisma*, *Sparganium* and *Potamogeton* (Fig 3). When visited in early July *P. caesus* and *Hydrochus angustatus* Germar were found to be present and a subsequent visit in October produced *Limnoxenus niger* (Gmelin), a total of thirty-three species being recorded for the pond. *P. caesus*, *H. angustatus* and *L. niger* were designated by Foster *et al.* (2020) as being Nationally Scarce. Though widespread on the coastal marshes, *L. niger* had not previously been recorded in the central Weald. The occurrence of the species at a second location slightly to the north of the triangle (TQ865444) appeared to confirm a relatively recent inland invasion. A notable absentee was *Nartus grapii* (Gyllenhal), which had previously been recorded at the Bethersden site and at other Wealden locations during 1981 but was not encountered during the recent survey.

Only one pond was found to have been infilled, though a new pond had been created (as was subsequently discovered) five years earlier approximately 200m from the original and more remote from the adjacent public footpath (TQ872418). The pond was well-vegetated and produced the only specimens of *Laccobius striatulus* (Fab.) and *Anacaena bipustulata* (Marsham) recorded in the survey before collecting was disrupted by the appearance of an irate and rather abusive owner, who was with some patience eventually placated and subsequently took an interest in the fauna of his pond.

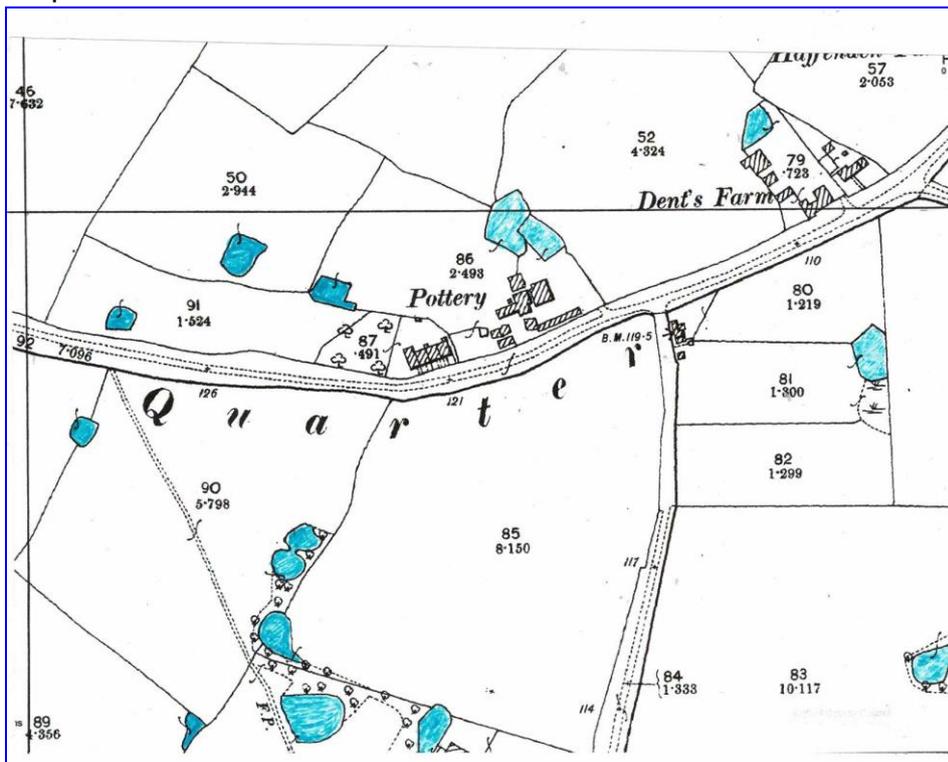


Figure 1
A pottery near
High Halden
and associated
ponds

The following forty-five species were recorded during the recent survey, the presence of which indicates that the Wealden ponds remain as valuable, though precarious habitats for aquatic beetles and consequently worthy of conservation.

<i>Peltodytes caesus</i> (Duftschmid)	<i>Helophorus brevipalpis</i> Bedel
<i>Haliphus lineatocollis</i> (Marsham)	<i>Helophorus aequalis</i> Thomson
<i>Haliphus ruficollis</i> (De Geer)	<i>Hydrochus angustatus</i> Germar
<i>Noterus clavicornis</i> (De Geer)	<i>Cercyon convexiusculus</i> Stephens
<i>Hygrobia hermanni</i> (Fab.)	<i>Hydrobius fuscipes</i> (L.)
<i>Laccophilus minutus</i> (L.)	<i>Limnoxenus niger</i> (Gmelin)
<i>Laccophilus hyalinus</i> (De Geer)	<i>Anacaena globulus</i> (Paykull)
<i>Hyphydrus ovatus</i> (L.)	<i>Anacaena limbata</i> (Fab.)
<i>Hydroglyphus geminus</i> (Fab.)	<i>Anacaena lutescens</i> (Stephens)
<i>Hygrotus inaequalis</i> (Fab.)	<i>Laccobius bipunctatus</i> (Fab.)
<i>Hygrotus confluens</i> (Fab.)	<i>Laccobius striatulus</i> (Fab.)
<i>Hydroporus angustatus</i> Sturm	<i>Helochares lividus</i> (Forster)
<i>Hydroporus palustris</i> (L.)	<i>Enochrus coarctatus</i> (Gredler)
<i>Hydroporus planus</i> (Fab.)	<i>Enochrus testaceus</i> (Fab.)
<i>Hydroporus pubescens</i> Gyllenhal	<i>Cymbiodyta marginella</i> (Fab.)
<i>Liopterus haemorrhoidalis</i> (Fab.)	<i>Berosus affinis</i> Brullé
<i>Agabus bipustulatus</i> (L.)	<i>Hydraena riparia</i> (Kugelann)
<i>Agabus nebulosus</i> (Forster)	<i>Hydraena testacea</i> Curtis
<i>Agabus sturmii</i> (Gyllenhal)	<i>Ochthebius minimus</i> (Fab.)
<i>Ilybius chalconatus</i> (Panzer)	<i>Limnebius nitidus</i> (Marsham)
<i>Rhantus suturalis</i> (Macleay)	<i>Dryops luridus</i> (Erichson)
<i>Colymbetes fuscus</i> (L.)	<i>Microcara testacea</i> (L.)
<i>Acilius sulcatus</i> (L.)	

CARR R 1986. The effects of human activity on the distribution of aquatic Coleoptera in southeastern England. *Entomologica Basiliensia* **11** 313-325.

CARR R & PHILP E G 1988. A summary of recent records of aquatic Coleoptera in Kent. *Entomologist's Gazette* **39** 211-226.

FOSTER G N, BILTON D T, HAMMOND M & NELSON B H 2020. *Atlas of Water Beetles of the British Isles – smaller families of Polyphaga*. Wallingford: Biological Records Centre, UK Centre for Ecology & Hydrology.

STRAKER E 1931. *Wealden Iron*. London: George Bell & Sons. reprinted 1969 Newton & Abbot: David & Charles Publishers) Ltd.

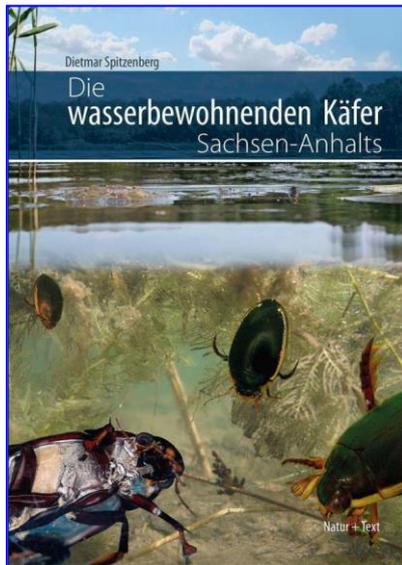
WOODCOCK A J A 1944. The Aquatic Coleoptera of East and West Kent. *Entomologist's Monthly Magazine*. **80** 31-41.

Received December 2020

UMBRIAN CATALOGUE

This covers 265 taxa in 18 families, with 38 species recorded from Umbra for the first time. It is also noted that *Agabus lotti* Turner, Toledo & Mazzoldi is the species formerly known as *A. uliginosus* (L.) in the region, but *coriacea* Laporte is retained as the *Meladema* of the region rather than *lepidoptera* Bilton & Ribera.

ROCCHI S, TERZANI F & MASCAGNI A 2021. Coletterofauna acquatica e semiacquatica dell'Umbria (Insecta, Coleoptera: Gyrinidae, Haliplidae, Noteridae, Hygrobiidae, Dytiscidae, Helophoridae, Georissidae, Hydrochidae, Hydraenidae, Scirtidae, Elmidae, Dryopidae, Limnichidae, Heteroceridae, Psephenidae, Chrysomelidae, Curculionidae). *Quaderno di Studi e Notizie di Storia Naturale della Romagna* **53** 65-153.



SAXONY-ANHALT – A COMPREHENSIVE ATLAS

📖 SPITZENBERG D 2021. *Die wasserbewohnenden Käfer Sachsen-Anhalts*. Rangsdorf: Landesamt für Umweltschutz Sachsen-Anhalt. €50.

This atlas provides detailed information on the aquatic beetle species in Saxony-Anhalt in a clear and compact form, but weighing in at 2 kg! It is based on over 68,000 records with coverage of 308 confirmed species in 14 families. Information varies slightly between groups, but includes superb habitus photographs for all species and some charming montages of beetle-rich habitats. Despite the watery title coverage extends to the terrestrial members of the main aquatic families, with excellent coverage of *Cercyon*, for example. The book includes conservation statuses that can be related to the Fauna-Flora-Habitat

Directive of the European Union. A slightly puzzling feature for most species is two versions of the same map, with the same data points against backgrounds either of altitude or landscape. The citation might be modified to include Dietmar Spitzenberg's collaborators – Andreas Schöne, Bernhard Klausnitzer and Werner Malchau.

GEORGIAN SPHAGNUM BOG

The Kolkheti is the smallest peatland region in the world with a unique type of mire, a percolation bog. Sixteen species of water beetle were found: *Haliphus lineolatus* Mannerheim, *H. ruficollis* (De Geer), *Noterus clavicornis* (De Geer), *Agabus bipustulatus* (L.), *Liopterus haemorrhoidalis* (Fab.), *Hydroporus ampliatus colchicus* Bilyashiwsky, *H. dorsalis* (Fab.), *Hydrovatus cuspidatus* Kunze, *Helophorus brevipalpis* Bedel, *Anacaena lutescens* (Stephens), *Helochares obscurus* (Müller), *Hydrochara semenovi* Zaitzev, *Coelostoma orbiculare* (Fab.), *Dryops auriculatus* Geoffroy, *Contacyphon padi* (L.), and *Donacia bicolora* Zschach. *H. ampliatus colchicus* was described as endemic to Georgia and the *Dryops* is new for Georgia. The list is unusual in being a mixture of common species and a few with more limited ranges, but with none of the more typical European tyrphobionts other than *C. padi*.

BILYASHIWSKY M M 2004. New and little-known dytiscid species (Coleoptera, Dytiscidae) of the south of the Palearctic region. *Proceedings of Zoological Museum of Kiev Taras Shevchenko National University* 2 44-55 (in Ukrainian with English abstract).

PROKIN A A, SAZHNEV A S & PHILIPPOV D A 2021. First data on aquatic Coleoptera of the Ispani *Sphagnum* bogs (Kolkheti Lowlands, Georgia). *Problems of Aquatic Entomology in Russia and adjacent territories: Materials of VIIIth All-Russian, with International participation, Symposium on Amphibiotic and Aquatic Insects. Vladikavkaz: North Ossetian State University Publishing House* 2021 151-157.

DINEUTUS HELLERI STUEBERI - FOUR EYES ON ONE EYE

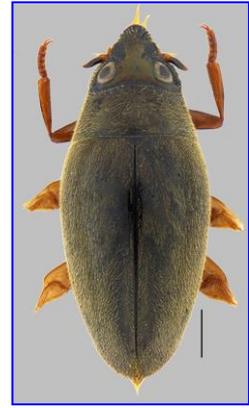
Dineutus helleri is a large, up to 18 mm, whirligig confined to New Guinea's north coast mountains. It and its subspecies are illustrated and redescribed, the subspecies *stueberi* being peculiar to the Cyclops Mountains area. The correspondent is Michael Balke.

SURBAKTI S, BALKE M, HÁJEK J & GUSTAFSON G. 2021. Notes on *Dineutus helleri* Ochs, 1925, with new records for the Cyclops Mountain Whirligig *Dineutus h. stueberi* Ochs, 1955 (Coleoptera, Gyridae). *Check List* 17 1061-1066.

GYRINIDAE IN CHINA

Eight gyrid taxa are newly recorded from China in addition to three newly described species of *Patrus* – *hainanensis*, *jiangxiensis* and *shangchuanensis*. A key to Chinese *Patrus* is provided. *Orectochilus murinus* Régimbart, illustrated here courtesy of the authors, is one of the species new for China. Fenglong Jia is the correspondent.

LIANG Z, ANGUS R B & JIA F 2021. Three new species of *Patrus* Aubé with additional records of Gyrinidae from China (Coleoptera, Gyrinidae). *European Journal of Taxonomy* **767** 1-39.



SARATOV BEETLES

Saratov lies north of Volgograd on the western bank of the Volga. The natural habitats of the area – forest-steppe, steppe and semi-desert – provide unique conditions for a range of rare water beetles, which are distributed between nine types of range.

SAZHNEV A S 2021. “Northern” elements in fauna of water beetles (Insecta: Coleoptera) of Saratov Oblast. *Field Biologist Journal* **3** (2) 154-158. [in Russian]

BELARUS PEAT BOG

A peat bog area was surveyed in the Kazjanskij State Landscape Reserve in northern Belarus. Forty-five species of water beetle were found in 45 sampling sites. The commonest species were *Ilybius aenescens* (Thomson), *Hydroporus tristis* (Paykull), *Enochrus affinis* (Thunberg) and *E. ochropterus* (Marsham). The fauna included *Agabus biguttulus* (Thomson), three species of *Colymbetes* and *Graphoderus zonatus* (Hoppe).

SHATARNOVA O 2021. The diversity and species composition of water beetles (Gyrinidae, Dytiscidae, Hydrophilidae) in a peat bog in Belarus. *Zoodiversity* **55** 113-120.

NEW WORLD HALIPLIDAE

This *magnum opus* covers 64 species of haliplid, each treated in Bernhard van Vondel’s inimitable style. Some of these species have not yet been reported from the Nearctic but may be expected to occur in the southern USA. These include *Haliphus kenneri* van Vondel, 2014, which was named for Rex Kenner, whose death in 2010 proved quite a setback to this project. Fortunately his database was made available for the review. All the Neotropical species of *Peltodytes* are included in this review. These include *P. roughleyi*, the only new species here, though there are several new synonyms.

VONDEL B J van 2021. Revision of the Nearctic Haliplidae (Coleoptera). *Tijdschrift voor Entomologie* **163** 101-298.

FLUKE UPDATE

This description of a new African fish fluke gets a mention here because it lists some of the water beetles associated with *Allocreadium neotenicum* Bray *et al.* The correspondent is Annemarië Avenant-Oldewage.

DOS SANTOS Q M, GILBERT B M, AVENANT-OLDEWAGE A & DUMBO J C 2021. Morphological and molecular description of *Allocreadium apokryffi* sp. n. (Digenea: Allocreadiidae) in South Africa, including notes on its biology, evolutionary history and an updated key to African *Allocreadium*. *Folia Parasitologica* **68** doi: 10.14411/fp.2021.013 pp. 16.

OVERWINTERING WHIRLIGIGS

Eleven species of Gyrinidae are currently known from Germany. There are few reports of what they do in the winter. Five species were recorded as adults in winter sampling in northern Germany. *Orectochilus villosus* (Müller) must overwinter entirely as larvae, being unknown as adults in the winter. The results for *Gyrinus* species are less clear, with the possibility of larval overwintering in some species and a retreat of adults to safe locations when the first frosts come. Illustrated is an icy ditch with *G. paykulli*



Ochs, *G. substriatus* Stephens and *G. suffriani* Scriba, courtesy of the author.

ROTHE U 2021. Winterbeobachtungen an Imaginalstadium von Gyriniden im Tiefland (Coleoptera, Gyrinidae). *Entomologische Nachrichten und Berichte* **65** 145-155.

MORE ON ROCKPOOL OCHTHEBIUS

The latest analysis of the rockpool subgenus *Cobalius* indicates that there are between 16 and 24 species mostly evolved from 6 to 0.11 million years ago, with the origin of *Cobalius* itself put in the Early Miocene, about 22 million years ago. The sixteen lineages identified genetically includes six classified as *subinteger* from Corsica, Madeira (but not *lanthanus* Ribera & Foster, in its own, 12th, lineage), Spain, Italy in Liguria and Sardinia, and three from the Cape Verde Islands.

In the second paper, the morphology of the three larval stages of *Ochthebius* (*Cobalius*) *balfourbrownei* Jäch, 1989 is described with special emphasis on the setae and pores. A key is given for the larvae of *O. balfourbrownei*, *O. capicola* Péringuey, *O. danjo* Nakane, *O. quadricollis* Mulsant and *O. subinteger* Mulsant & Rey.

SABATELLI S, AUDISIO P & DI GIULIO A 2021. Larval morphology of the water beetle *Ochthebius balfourbrownei* (Coleoptera: Hydraenidae) from marine rockpools of Cape Verde Islands. *The European Zoological Journal* **88** 659-668.

SABATELLI S, RUSPANTINI P, CARDOLI P & AUDISIO P 2021. Underestimated diversity: cryptic species and phylogenetic relationships in the subgenus *Cobalius* (Coleoptera: Hydraenidae) from marine rockpools. *Molecular Phylogenetic and Evolution* **163** doi.org/10.1016/j.mpev.2021.107243 pp 14.

CHINESE AGRAPHYDRUS

This paper comes quickly on the heels of a review of Chinese *Agraphydrus* by Albrecht Komarek and the late Franz Hebauer (2018) in which 33 new species were described. Here, over 2,000 specimens were checked and four more new species were discovered. A revised key is provided. The correspondent is Fenglong Jia.

KOMAREK A & HEBAUER F 2018. Taxonomic revision of *Agraphydrus* Régimbart. 1903. 1. China and Taiwan (Coleoptera: Hydrophilidae: Acidocerinae). *Zootaxa* 4452 1-101.

YANG Z-M, JIA F, JIANG L & GUO Q 2021. Four new species of *Agraphydrus* Régimbart, 1903 with additional faunistic record from China (Coleoptera, Hydrophilidae, Acidocerinae). *Deutsche Entomologische Zeitschrift* **68** 189-206.

DYTISCUS DIMIDIATUS DIET

These feeding results indicate that the larva of *D. dimidiatus* Bergsträsser will complete their development on *Asellus* alone or on a mixture of prey items. It is the quantity of prey that matters, not their quality. Thanks to Peter Hendriks for use of the photograph.

HENDRIKS P & VERDONSCHOT P 2021. Observations on the growth of *Dytiscus dimidiatus* (Coleoptera: Dytiscidae) larvae reared on single or multiple prey species. *Entomologische Berichten* **81** 153-159.

**DYTISCUS MARGINALIS VS NEWT**

This is claimed as the first record of *D. marginalis* larvae attacking a mature newt. The authors also note two publications suggesting that newts are unpalatable to diving beetles. The correspondent is Gonzalo Mucientes.

EIROA J, SABUCEDO D X & MUCIENTES G 2021. Field observation of hunting behavior by larva and adult of diving beetle *Dytiscus marginalis* Linnaeus, 1758 preying on *Lissotriton boscai* (Lataste, 1879). *Entomological Science* doi: 10.1111/ens.12481 3 pp.

**RUSSIAN ENOCHRUS (LUMETUS)**

This paper is more welcome than usual as we have been waiting for a long time for work continuing that of the late Stefan Schödl. *Lumetus* are those without the excision of the last visible ventrite to be seen in the subgenus *Methydrus*. The following species are so well illustrated that there is little need to translate the text – *Enochrus ater* (Kuwert), *E. bicolor* (Fab.), *E. fuscipennis* (Thomson), *E. halophilus* (Bedel), *E. hamifer* (Ganglbauer), *E. ochropterus* (Marsham), *E. puetzi* Hebauer, *E. quadripunctatus* (Herbst), *E. sahlbergi* (Fauvel), *E. segmentinotatus* (Kuwert), *E. testaceus* (Fab.). Another paper to have by your side in European studies.

LITOVKIN S V, SAZHNEV A S & PROKIN A A 2021. Species of the subgenus *Lumetus* Zaitzev (Coleoptera, Hydrophilidae: *Enochrus* Thomson) of the fauna of Russia and adjacent counties. *Entomological Review* **100** 390-416. [in Russian with English abstract]

STERNOPRISCUS LARVAE

Following a detailed analysis it is proposed that *Sternopriscus* falls into two groups based on the presence or absence of swimming hairs. The absence of such hairs on the femora and the presence of a single swimming hair on each tarsus and tibia are characters that *S. alpinus* Hendrich & Watts and *S. multimaculatus* (Clark) share with having unusually long urogomphi. It is possible that elongate urogomphi compensate for the absence of more swimming hairs, assisting in swimming ability by providing a horizontal rudder.

ALARIE Y, MICHAT M C & WATTS C H S 2021. Description of the mature larva of four species of the Australasian endemic genus *Sternopriscus* Sharp, 1882 (Coleoptera: Dytiscidae) with phylogenetic considerations. *Aquatic Insects* doi.org/10.1080/01650424.2021.1919716

AUSTRALASIAN *LEIODYTES*

In Australia the three known *Leiodytes* species are confined to tropical and subtropical areas, but none is endemic, the range extending to New Guinea. *L. migrator* (Sharp), originally described as a *Bidessus*, and then transferred to *Clypeodytes*, is the most widely distributed species. The others are the newly described *L. surianae* and *L. wattsi*.

HENDRICH L, WANG L-J & BALKE M 2021. Taxonomic revision of Australasian diving beetles in the genus *Leiodytes* Guignot, 1936 (Coleoptera: Dytiscidae, Bidessini). *Zootaxa* **4990** 23-44.

DREDGING EXPERIENCE IN POLAND

Part of the River Krąpiel in north-west Poland was dredged in the winter of 2009. One hundred and twenty-four species of macroinvertebrate were found before dredging and 199 afterwards. The most speciose group was water mites (69 species recorded in total) followed by beetles with 57 species. Twenty-eight species of beetle were recorded before dredging as opposed to 43 afterwards.

STRYJECKI R, ZAWAL A, KREPSKI T, STEPIEŃ E, BUCZYŃSKA E, BUCZYŃSKI P, CZACHOROWSKI S, JANKOWIAK Ł, PAKULNICKA J, SULIKOWSKA-DROZD A, PEŠIĆ V, MICHONSKI G, GRABOWSKI M, JABŁOŃSKA A, ACHREM M, OLECHWIR T, PIETRZAK L & SZLAUER-ŁUKASZEWSKA A 2021. Anthropogenic transformations of river ecosystems are not always bad for the environment: multi-taxa analyses of changes in aquatic and terrestrial environments after dredging of a small lowland river. *PeerJ* doi 10.7717/peerj.12224 pp. 21.

FRENCH GUIANA

This country lies between Surinam and Brazil, and the survey concentrated on its coastal fringe in 2019. Sixty species were found at 23 sites. Twenty-six species are reported as new, including for example the elmid *Gyrelmis nubila* Hinton and the dytiscids *Bidessodes charaxinus* Young and *Desmopachria iridis* Young, originally described from Brazil. Sixty species are illustrated.

CLAVIER S, BARR C, LE PAGE P, POST D & SHEPARD W 2021. Coléoptères aquatiques de la frange littorale de Guyane: inventaire et iconographie des familles Elmidae, Dryopidae, Ptilodactylidae, Dytiscidae et Noteridae. *Contribution à l'étude des Coléoptères de Guyane* **13** 3-15.

BIDESSUS - GOEZE GOES

This ruling is primarily concerned with conservation of the generic type species but the most obvious effect in a Palaearctic checklist will be the name *Bidessus unistriatus* (Schrank, 1781). Goeze's work in 1777 was not consistently binominal and the names he proposed are therefore unavailable. Another possible name for *unistriatus* is *Dytiscus parvulus* Müller, 1776 is suppressed. It should also be noted that *Bidessus* Sharp is based on a description in 1880 rather than in Sharp's 1882 *Magnum Opus*. The works originating these changes are covered in **Latissimus** **43** 8 and **44** 17. The best contact would be Hans Fery.

GOEZE J A E 1777. *Entomologische Beiträge zu des Ritter Linné* **12**. Ausgabe des *Natursystems*. 1. Leipzig: Wiedmann.

ICZN 2021. Opinion 2470 (Case 3744) – *Bidessus* Sharp, 1880 (Coleoptera, Dytiscidae, Bidessini) usage conserved. *Bulletin of Zoological Nomenclature* **76** 48-50.

SHARP D 1880. Avis préliminaire d'une nouvelle classification de la famille des Dytiscidae. *Annales de la Société Entomologique de Belgique* **23** Comptes Rendus cxlvii-cl.

DINOSAURIFORM DUNG WITH WATER BEETLES?

Upper Triassic fossilised dung from a Polish clay pit was found to contain much material of a beetle newly named as *Triamyxa coprolithica* assigned to a new family, Triamyxidae in the Myxophaga. Nearly all myxophagans are at least partly aquatic, hence the claim of a water beetle. The material is almost as well preserved as in amber and can be visualised in three dimensions (or as here with thanks to the authors). The most likely depositor is or was *Silesaurus opolensis* Dzik, a dinosauriform reptile about the size of a human being, and classified as closely related to the dinosaurs.



QVARNSTRÖM M, FIKÁČEK M, WERNSTRÖM J V, HULD S, BEUTEL R.G, ARRIAGA-VARELA E, AHLBERG P E & NIEDŹWIEDZKI B 2021. Exceptionally preserved beetles in a Triassic coprolite of putative dinosauriform origin. *Current Biology* doi.org/10.1016/j.cub.2021.05.015.

HYDROPHILID GENITALIA STUDY

The internal genitalia of 52 species of Hydrophilidae, including 22 species of *Sternolophus*, were compared. Differences between males were to be observed at generic level but differences between females were found at species level, in particular the length of the spermathecal duct.

NASSERZADEH H 2020. A comparative morphological study of the genital tube in some hydrophilid species (Coleoptera: Hydrophilidae) with a discussion on the importance of the internal genital characters in phylogenetic studies. *Journal of Entomological Society of Iran* **40** 201-227.

ILYBIOSOMA LARVAE

The species are *I. bjorkmanae* (Hatch), *I. lugens* (LeConte), *I. minnesotensis* (Wallis), *I. pandurus* (Leech), and *I. regularis* (LeConte). The strongly emarginate siphons of first instar larvae appear to characterise the genus, though this feature is also found in *Platynectes* and *Hydrotrupes*. The discussion includes the wonderful expression “unresolved polytomy” to describe a section of the Agabinae.

ALARIE Y & MICHAËL M C 2021. Larval morphology of *Ilybiosoma* Crotch, 1873 of (Coleoptera: Dytiscidae): description of five Nearctic species with phylogenetic considerations. *Aquatic Insects* doi.org/10.1080/01650424.2021.195759 pp 31.

THOMAS HEYSHAM 1791-1857

Water beetles don't often get mentioned in *Antenna*, but in this account of an early insect collector in north-west England the question of record reliability is exemplified by them. Frank Day, one time Honorary Curator of Carlisle Museum, commented that some of Thomas Heysham's records had been called into account, probably because he reported the rare species and not the common ones. Day's experience was that most of the records could be ratified with effort, and those that could not be confirmed probably related to sites that had changed in character. "He [Day] cites the water beetles that have disappeared from Cardew Mire, which is now a flooded aggregates quarry".

HODKINSON I 2021. Thomas Coulthard Heysham of Carlisle (1791-1857): a Cumbrian naturalist and insect collector. *Antenna* **45** 73-77.

COTHILL FEN, ENGLAND

Jeremy Biggs, Freshwater Habitats Trust, notes that they cannot find *Gyrinus suffriani* Scriba at Cothill Fen, Berkshire, any more, the last record being in November 1969 by Robert Angus and David Bilton. Cothill Fen is a calcareous fen in which the other interesting beetle would have been *Eubria palustris* Germar, a specimen being in Oxford University Museum, taken by Commander J.J. Walker some time before 1920. In passing Jeremy noted an extensive publication by Judith Webb concerning Cothill Fen.

<https://freshwaterhabitats.org.uk/wp-content/uploads/2020/08/JW-Cothill-Fen-Hist-FINAL-05-08-2020.pdf>

WEBB J A 2020. *The history of Cothill National Nature Reserve (The Ruskin Reserve)*. Oxford: The Freshwater Habitats Trust.

DIVING BEETLE SWIMMING POWER

Cybister bengalensis Aubé could be the model for a "bionic unmanned underwater vehicle". This paper is as much to do with retreat as it is with forward swimming speed. Unlike organisms such as fish, amphibians, turtles and jellyfish these beetles can retreat without turning around, a possibility of interest in the design of robots. The tibiae, tarsi and associated bristles are stretched out in forward movement to achieve maximum thrust, but the tarsi are rotated and the bristles folded in retreat. Almost 9.8 m/s² of acceleration is achieved at the start of a retreat. The motions of the hind legs have been modelled to identify a possible new propulsion method for robots. The correspondent is Jingwei He.

QI D, ZHANG C, HE J, YUE Y, WANG J & XIAO D 2021. Observation and analysis of diving beetles movements while swimming. *Scientific Reports, Nature* **11** 16581 10 pp.

MOROCCAN HYDRADEPHAGA

A critical checklist of 112 species is provided based on both published and unpublished sources. *Hydroglyphus major* (Sharp) is newly recorded from Morocco. Six species - *Agabus dilatatus* Brullé, *Hydroporus longulus* Mulsant & Rey, *H. nigrita* (Fab.), *H. planus* (Fab.), *Bidessus pumilus* (Aubé) and *Ilybius fuliginosus* (Fab.) - are rejected as Moroccan.

BENAMAR L, BENNAS N, BELHAJ A, BOULAHFA N, HASSOUN M & MILLAN A 2021. An updated checklist of Gyrinidae, Haliplidae, Noteridae, Hygrobiidae and Dytiscidae (Coleoptera: Adephaga) of Morocco, with notes on chorology. *Aquatic Insects* doi.org/10.1080/01650424.2021.1939884 125 pp.

PETER HAMMOND 1941-2021

Max Barclay alerted the beetling world to this great loss, not wholly unexpected given Max's allusion to that "perpetual pipe". The editor knew Peter mostly through conversations held beside the Flammables Store on the roof of the Museum when we both smoked. Peter contributed about 500 water beetle records to the recording scheme for Britain and Ireland. They were mostly from Essex, where he attended King Edward VI School in Chelmsford, but of course he went on to record rather more of the world's beetles. Robert Angus is thanked for producing an obituary in time for *Latissimus* 50. Images seem to be in short supply, the one here being from Verrall Day in 2004 when Peter



[left] was in conversation with Colin Johnson, Roger Booth being "on guard" by the look of it! Sadly, one must also couple this image with the loss of Colin, see p. 41. Peter's funeral was scheduled for Mortlake Crematorium on 1 October 2021.

Robert Angus writes....

The passing of Peter Michael Hammond on Friday 17 September marks the end of an important era in the study of British (and other) beetles and, for me, the loss of a highly valued and greatly respected friend.

Peter read Psychology at Cambridge and was, he told me, much interested in Chairman Mao's social experiments in China. This led him to apply to the Chinese for a position teaching English to schoolchildren. He asked to do this for one year, but the Chinese said no, it had to be for two years as he would not be very useful to begin with, until he had acquired a working knowledge of the Chinese language. So it was that Peter spent two years in Harbin in the early 1960s, returning with an extensive collection of beetles. Peter was a brilliant Coleopterist with an eagle's eye for details of microsculpture and other morphological features and a keen appreciation of their significance. His main focus was on the Staphylinidae, but he had an excellent knowledge of beetles as a whole.

I first met Peter in the Natural History Museum, which I used to visit in the course of taxonomic studies for my D. Phil. degree. He showed me the *Helophorus* he had brought back from China, including the species which I described as *H. hammondi*. I learn from Max Barclay that this was the first of the 60-odd beetles named after Peter. It was always interesting to talk about beetles with Peter and it was with great pleasure that I discovered on my return in 1970 from 10 months in Russia that he had been appointed Head of the Coleoptera section of the museum. He was a breath of fresh air! On two occasions I attended the departmental Christmas parties he held in his house in Turnham Green – brilliant occasions during which various members of staff revealed hidden talents I hadn't even dreamed of. E. A. J. Duffy's grotesque water-colours in the style of Arthur Rackham's illustrations for the *Wind in the Willows* were particularly striking.

One occasion I particularly remember was a meeting at Royal Holloway on the subject of saproxylic beetles. This included a reception held on one of the balconies

of the main Founder's Building. Peter was among those upturning the tubs of shrubs and shaking them vigorously to release their associated weevils! Then the Pimm's. Peter remarked that his glass had a rather a lot of cucumber in it. "It's because you are so cool" was the very apt response.

Well, time passes and in 2010 I attended his retirement party in the Museum. In the course of conversation he told me he had been one of the examiners for my London D.Sc. degree. This was indeed a revelation – in the London University system the candidates were never told who their examiners were, and I confess I hadn't really thought about it. "Well," I said to him, "you could have knocked me over with a feather – but actually you have!"

So, there it is – another milestone on Life's journey. I am inclined to say that Peter's appointment as head of the Coleoptera section in the Museum was the start of the modern era – but perhaps I'm showing my age!

We all offer our condolences to his wife Beth Okamura, and to his children Tom, Lucy and Véréne.

COLIN JOHNSON 30 April 1943- 25 August 2021

Dmitri Logunov has confirmed that Colin died recently after a long battle with Huntingdon Chorea. An appreciation of Colin was produced by Diana Arzuza last year and we may expect obituaries in at least one entomological magazine in due course. Colin generated about 200 records for the UK and Ireland recording scheme and introduced several water beetles to the British list, but this was, of course, only a very small part of his work on beetles at Manchester Museum.

ARZUZA D 2020. A life devoted to describing tiny beetles – Colin Johnson (British coleopterist). *Entomology Manchester*, November 2020.

<https://entomologymanchester.wordpress.com/2020/11/18/a-life-devoted-to-describing-tiny-beetles-colin-johnson-british-coleopterist/>

POLISH LAKE FAUNA

The Kackie Lake lies in the northern part of Poland in Gdynia. The terrestrial beetle fauna is well recorded here but the water beetles look a little thin, with *Rhantus notaticollis* (Aubé) and *Donacia aquatica* (L.) being of some interest.

KONOPKO D 2021. Przyczynek do poznania chrząszczy użytku ekologicznego „Jezioro Kackie” w Gdynia. [A contribution to the knowledge of beetles of ecological site “Kackie Lake” in Gdynia] *Notatki entomologiczne* 6 11-24.

KRUGŁE BOGNO AGAIN

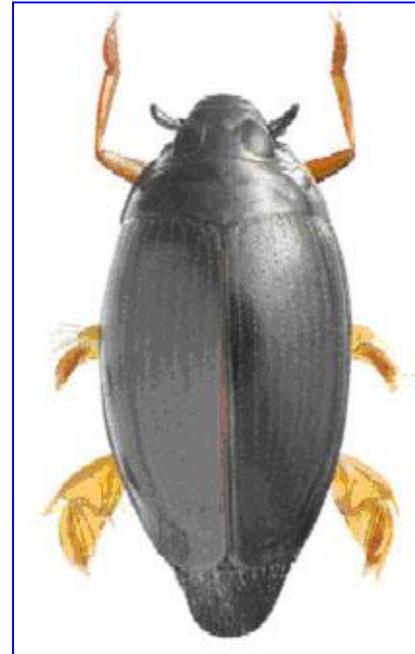
The 2021 paper is most odd in several respects, in particular ignoring a paper on the selfsame Polish bog (see *Latissimus* 43 13) in which 51 species of water beetle were reported. In the present paper, peat pools were sampled in 2010, 2013 and 2020 in three seasons. On each occasion three samples were taken, each of 10 sediment cores each of which would appear to cover a surface area of 15.2 cm². That's 3 x 3 x 3 x 10 x 15.2 = 0.4 square metres, i.e. one good swing of the pond net. In contrast to the samples of 2010 and 2013 those in 2020 produced only chironomid and chaoborid fly larvae. Perhaps Edyta and Paweł had removed all the beetles in 2013?

BUCZYŃSKA E & BUCZYŃSKI P 2019. Aquatic insects of man-made habitats: environmental factors determining the distribution of caddisflies (Trichoptera), dragonflies (Odonata), and beetle (Coleoptera) in acidic peat pools. *Journal of Insect Science* 19 1-15.

TARKOWSKA-KUKURYK M 2021. Environmental drivers of macroinvertebrate assemblages within peat pool habitat – implication for bioassessment. *Water* 13 2369 pp. 8.

RUSSIAN FAR EAST

The Sikhote-Alin Nature Reserve is about 4,000 km², lying in Primorsky Krai, a province of Russia between China and the Sea of Japan. It produced 27 species of water beetle. The paper also covers additional records of 29 species from the province. Illustrated are *Ametor scabrosus* Horn, *Hydrocassis lucifer* Shatrovsky, *Enochrus japonicus* (Sharp), *Heterlimnius gapyeongensis* (Jung, Kamite & Bae), and, as seen here, photographed by Professor Kyrill V. Makarov, *Gyrinus sachalinensis* Kamyia. *Oreodytes mongolicus* (Brinck), *Sphaeridium bipustulatum* Fab. and *S. marginatum* Fab. are recorded from the Russian Far East for the first time. The possibility that *Cercyon emarginatus* Baranowski is a synonym of *C. terminatus* (Marsham) comes as a surprise – a specimen the editor had from Michael Hansen as *emarginatus* does not resemble *terminatus*.



SAZHNEV A S, PROKIN A A & SERGEEV M E

2021. New data on water beetles (Coleoptera: Gyrinidae, Haliplidae, Noteridae, Dytiscidae, Hydrophilidae, Elmidae) of Primorsky Krai (Russia). *Russian Entomological Journal* **30** (3) 264–274 doi: 10.15298/rusentj.30.3.03

EVOLUTION IN UNDERGROUND ISLANDS

The usual theory to explain the origin of underground species is that they were each created by an independent colonisation of the subterranean habitat. That could be associated with climatic relicts, species surviving underground in areas where surface populations have been wiped out, or with adaptive shifts of populations radiating out to exploit all sorts of habitat. including the subterranean one. The theory is investigated that speciation can occur within an underground system, one cave-dweller giving rise to another one. Vision genes were investigated in some of the *Paroster* diving beetles found in Australian calcretes. Deleterious changes to these genes were found to be the same in clusters of species occupying the same system, indicating that they had arisen from a common subterranean ancestor.

LANGILLE B L, HYDE J, SAINT K M, BRADFORD T M, STRINGER D N, TIERNEY S M, HUMPHREYS W F, AUSTIN A D & COOPER S J B 2020. Evidence for speciation underground in diving beetles (Dytiscidae) from a subterranean archipelago. *Evolution* **75** 166-175.

THRACIAN RECORDS

Thrace is the European part of Greece adjoining Bulgaria and Greece. The species reported as new are therefore mainly to be found in Europe:- *Gyrinus substriatus* Stephens, *Aulonogyrus concinnus* (Klug), *Haliplus flavicollis* Sturm, *Hydaticus aruspex* Clark, *Rhantus suturalis* (Macleay), *Platambus maculatus* (L.), *Laccophilus hyalinus* (De Geer), *Helophorus grandis* Illiger, *Laccobius minutus* (L.), *Hydrochara flavipes* (Steven), and *Cercyon littoralis* Gyllenhal.

AYDIN G B, ÇAMUR-ELİPEK B & TOPKARA E T 2021. Contributions to the knowledge on aquatic/semi-aquatic Coleoptera (Insecta) fauna of Turkey with first records in Turkish Thrace. *Journal of Entomological Research Society* **23** 157-172.

BIDESSUS NEW SUBSPECIES

This new taxon belongs to the *Bidessus unistriatus* group. It can be distinguished from the type species by its broader body and differences in the shape of the male genitalia. Its distribution in the south of Turkey is mapped alongside *B. anatolicus kadmos* Wewalka in eastern Turkey and *B. anatolicus phoenix* Wewalka from Israel. The correspondent is Hans Fery.

AYKUT M, TAŞAR G E & FERY H 2021. *Bidessus anatolicus adiyaman* ssp. n. from Adiyaman province, southern Turkey (Coleoptera, Dytiscidae, Bidessini). *Zootaxa* **5027** 563-575.

A NEW BLACK LIODESSUS

The largely black *Liodessus picinus* is described from 3,500 m asl near Bogota in Colombia. The checklist of High Andean *Liodessus* now runs to fourteen species.

BALKE M, SUAREZ-MEGNA Y, OSPINA-TORRES R, VENEGAS J S, PRIETO C & HENDRICH L 2021. A new Colombian species of *Liodessus* diving beetles from the Páramo de Sumapaz (Coleoptera, Dytiscidae, Bidessini). *ZooKeys* **1059** 79-87.

TERRESTRIAL HYDRAENIDS IN TANZANIA

The genus *Riberazantaena* is erected to cover a new species, *latissima*, and *Protozantaena grebennikovi* Perkins. Both appear to be endemic to Tanzania, living in damp leaf litter in mountain forests of the Eastern Arc.

BILTON D T 2021. *Riberazantaena*, a new hydraenid genus from the Eastern Arc Mountains of Tanzania (Coleoptera, Hydraenidae). *Zootaxa* **4999** 573-581.

HEAT TOLERANCE ABOVE AND BELOW GROUND

The study animals were the subterranean dytiscids *Paroster macrosturtensis* (Watts & Humphreys) and *P. mesosturtensis* (Watts & Humphreys) from Western Australia and three related surface-living species. The subterranean species were found to have a lower thermal tolerance, 38.3-39.0°C, than the surface species, 42.0-44.5°C. The subterranean species have a margin of about 10°C given that groundwater varies between 18.4°C and 28.8 °C, and this suggests that they can survive warming of up to 5 °C predicted for the region by 2090.

JONES K K, HUMPHREYS W F, SACCÒ M, BERTOZZI T, AUSTIN A D & COOPER S J B 2021. The critical thermal maximum of diving beetles (Coleoptera: Dytiscidae): a comparison of subterranean and surface-dwelling species. *Current Research in Insect Science*
doi:<https://doi.org/10.1016/j.cris.2021.100019> pp.18.



MIRA IPA

The temptation to use this beer for the front and back covers of *Latissimus 50* has been resisted. Franck Bameul notes that it is a beer that he found at his local Leclerc produced by the brewery at La-Teste-de-Buch close to the Bassin d'Arcachon. It is made with spring water, 22,500 years old. It is called the Classic.



Latissimus is the newsletter of the Balfour~Browne Club.
It was produced on 8 October 2021

Contact addresses

Carlos Abrahams, Baker Consultants Ltd., West Platform, Cromford Station, Matlock, Derbyshire DE4 5JJ, England, UK carlos.abrahams@ntu.ac.uk

Yves Alarie, Department of Biology, Laurentian University, Ramsey Lake Road, Sudbury, ON P3E 2C6, Canada yalarie@laurentian.ca

Robert Angus, Department of Life Sciences (Insects), the Natural History Museum, Cromwell Road, London SW7 5BD, England, UK r.angus@rhul.ac.uk

Diana Arzuza dianaarzuzabuelvas@manchester.ac.uk

Annemarië Avenant-Oldewage, Department of Zoology, University of Johannesburg, PO Box 524, Auckland Park, Johannesburg 2006, South Africa oldewage@uj.ac.za

Michael Balke, SNSB-Zoologische Staatssammlung München, Münchhausenstraße 21, 81247 Munich, Germany balke.m@snsb.de

Luna Benamar, Département de Biologie, Faculté des Sciences de Tetouan, Université Abdelmalek Essaâdi, 93002, Tetouan, Morocco benamar.loubna-etu@uae.ac.ma

Gazel Burcu Aydin, Trakya University, Department of Biology, Faculty of Science, 22100, Edime, Turkey gburcuaydin@trakya.edu.tr

Michael Balke, Department of Entomology, SNSB-Zoologische Staatssammlung, Munich, Germany balke@snsb.de

Franck Bameul, 124 avenue des Pyrénées, F-33140 Villenave D'Ornon, France fbameul@wanadoo.fr

David Bilton, Marine Biology and Ecology Research Centre, School of Biological and Marine Sciences, University of Plymouth, Drake Circus, Plymouth PL4 8AA, England, UK d.bilton@plymouth.ac.uk

John H. Bratton, 18 New Street, Menai Bridge, Anglesey, Wales, LL59 5HN, UK

jhnbratton@yahoo.co.uk

Simon Clavier, Onikha, Bureau d'études Eau & Environnement, Pk 9 route du degrad Saramaca, 97310 Kourou, French Guiana

Ron Carr, 9 The Mallows, Monckton's Lane, Maidstone, Kent ME14 2PX, England, UK roncarr200@aol.com

Hans Fery, Rauschstr. 73, D-13509 Berlin, Germany hanfry@aol.com

Jennifer Girón, Department of Entomology, Purdue University, West Lafayette, Indiana, USA entiminae@gmail.com

John Gould, School of Environmental and Life Sciences, University of Newcastle, Callaghan, 2308 NSW, Australia john.gould@uon.edu.au

Jack Greenhalgh, School of Biological Science, Bristol, England, UK and Environment Change Research Centre, Dept of Geography, University College London, Gower Street, London WC1E 6BT, UK jack.greenhalgh@bristol.ac.uk

Masakazu Hayashi, Hoshizaki Green Foundation, 1664-2 Sono, Izumo, 691-0076 Lapan hgf-haya@green-f.or.jp

Jingwei He, Key Laboratory of Bionic Engineering, Jilin University, Room 218, Bionics Building, 5988# Renmin Street, Changchun 130025, China jluzcc@jlu.edu.cn

Lars Hendrich, SNSB-Zoologische Staatssammlung München, Münchhausenstraße 21, 81247 Munich, Germany hendrich@snsb.de

Paul Hendriks, Oostwold (Leek), The Netherlands hendriksmast@home.nl

Ian Hodkinson i.d.hodkinson@ljmu.ac.uk

Fenglong Jia, Institute of Entomology, Life Sciences School, Sun Yat-sen University, Guangzhou, 510275, Guangdong, China lssjfl@mail.sysu.edu.cn

Karl K. Jones, Australian Centre for Evolutionary Biology and Biodiversity, Department of Ecology and Evolutionary Biology, School of Biological Sciences, University of Adelaide, South Australia 5005, Australia karl.jones@adelaide.edu.au

Dariusz Konopko, ul. Dedala 8/2/9, 81-197 Gdynia, Poland darkon27@wp.pl

Barbara L Langille, Australian Centre for Evolutionary Biology and Biodiversity, Department of Ecology and Evolutionary Biology, School of Biological Sciences, University of Adelaide, Adelaide, South Australia 5005, Australia barbara.langille@adelaide.edu.au

Stanislav V. Litovkin, Russian Entomological Samara 443016 Russia sats.lit@gmail.com

Haing-Che Liu, Department of Environmental Engineering & Management, Chaoyang University, 168 Jifeng E. Road, Taichung City 413, Taiwan td965771@gmail.com

Keita Matsumoto, Department of Life Sciences, Natural History Museum, Cromwell Road, London SW7 5BD, England, UK k.matsumoto@nhm.ac.uk

Yoandri Megna, Departamento de Biología, Universidad de Oriente, Patricio Lumumba s/n, Santiago de Cuba, Cuba ysmegna@gmail.com

Gonzalo Mucientes. Grupo de Estudios do Sur da Dorsal Galega, C/Barro Igrexa – Outedo 49.36873 Covelo, Pontevedra, Spain gonzalomucientes@gmail.com

Hiva Nasserzadeh, Department of Limnology and Bio-Oceanography, University of Vienna, Althanstraße 14, A-1090 Vienna, Austria h_naserzadeh@yahoo.com

Anders Nilsson, Mulljöö 258, S-41490 Nordmaling, Sweden andersnilsson258@gmail.com

Jean Ortega, Programa de Pós-Graduação em Ecologia e Manejo de Recursos Naturais, Universidade Federal do Acre, Sala de Pesquisadores Visitantes, BR-364, Km 04, Campus Universitário, Rio Branco, AC69915-900, Brazil ortegajejan@gmail.com

Sasha Prokin, Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, Russia prokina@mail.ru

Pierre Queney, 10 rue Descartes, F-92190 Meudon, France pierre.queney@wanadoo.fr

Martin Qvarnström, Department of Organismal Biology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18A, 752 36, Uppsala, Sweden martin.qvarnstrom@ebc.uu.se

Saverio Rocchi, Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", via Romana 17, I-50125 Firenze, Italy rocchisaverio@gmail.com

Udo Rothe, Naturkundemuseum Potsdam, Breite Straße 11/13, D-14467 Potsdam, Germany udo.rothe@rathaus.potsdam.de

Simone Sabatelli, Department of Biology & Biotechnology "Charles Darwin", Sapienza University of Rome, Viale dell'Università 32, 00186 Rome, Italy simone.sabatelli@uniroma1.it

Aleksey Sazhnev, Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, 135 Borok vill., Yaroslavl Oblast, 152742, Russia sazh@list.ru

O. Shatarnova, Vitebsk State University P.M. Masherau, Maskousky ave. 33, Viciebsk, 21008 Belarus olga.shatarnova@yandex.by

William Shepard, 117 Spring Water Way Folsom, CA 95630-2074, USA william.shepard@cSUS.edu

Martin Soesbergen, Lelystad, the Netherlands martin.soesbergen01@rws.nl

Robert Stryjecki, Department of Zoology and Animal Ecology, University of Life Sciences in Lublin, Poland robert.stryjecki@up.lublin.pl

Monika Tarkowska-Kukuryk, Department of Hydrobiology and Protection of Ecosystems, University of Life Sciences in Lublin, Dobrzańskiego 37, 20-262 Lublin, Poland monika.kukuryk@up.lublin.pl

Mario Toledo, Via Tosoni, 20, I-25123 Brescia, Italy toledo.pinguicula.mario3@gmail.com

Alexandros Vasilikopoulos, Centre for Molecular Biodiversity Research, Zoological Research Museum Alexander Koenig, 53113 Bonn, Germany alexvasilikop@gmail.com

Bernhard van Vondel, Natuurhistorisch Museum Rotterdam, p/o Roestuin 78, 3343 CV Hendrik-Ido-Imbacht, the Netherlands haliplus@kabelfoon.nl

Judy Webb judy.webb@virgin.net also www.judithwebb.weebly.com

CONTENTS			
AQUATIC BEETLE LIVING IN THE CITY STREETS OF TAIWAN H-C Liu			10
GENETIC EXPERIMENTS ON <i>HELOPHORUS</i> – REVISITED AFTER HALF A CENTURY R B Angus			11
<i>OCHTHEBIUS LEJOLISII</i> IN AN ARTIFICIAL HABITAT J H Bratton			1
<i>OCHTHEBIUS LEJOLISII</i> ON PLYMOUTH BREAKWATER D T Bilton			1
THE DEVIL'S ADVOCATE IN THE SEARCH FOR THE INVASIVE WATER BEETLE A N Nilsson			2
THE WEALDEN TRIANGLE R Carr			30
Editorial and miscellanea			
CONTACT ADDRESSES	44	MIRA IPA	43
Books			
NOUVELLE APPROCHE	9	SAXONY-ANHALT – A COMPREHENSIVE ATLAS	33
Papers			
A NEW BLACK <i>LIODESSUS</i>	43	HYDROPHILID GENITALIA STUDY	38
ACIDOCERINAE CATALOGUE	27	<i>HYDROVATUS</i> IN TAIWAN	29
ADEPHAGAN EVOLUTION	9	<i>ILYBIOSOMA</i> LARVAE	38
AUSTRALASIAN <i>LEIODYTES</i>	37	JAPANESE ELMIDS	9
BELARUS PEAT BOG	34	KALMAR VS ÖLAND	28
<i>BIDESSUS</i> - GOEZE GOES	37	KRUGŁE BOGNO AGAIN	31
<i>BIDESSUS</i> NEW SUBSPECIES	43	LIMNICHIDAE IN ANGOLA	8
CHINESE <i>AGRAPHYDRUS</i>	35	LOMBARDY LIST	29
<i>COPELATUS</i> IN CUBA	28	MORE ON ROCKPOOL <i>OCHTHEBIUS</i>	35
<i>COPELATUS</i> IN SABA	28	MOROCCAN HYDRADEPHAGA	39
COTHILL FEN, ENGLAND	39	NEW RECORDS FROM FLORENCE	29
<i>DINEUTUS HELLERI STUEBERI</i> - FOUR EYES ON ONE EYE	33	NEW WORLD HALIPLIDAE	34
DINOSAURIFORM DUNG WITH WATER BEETLES?	38	NORFOLK NOISES	29
DIVING BEETLE SWIMMING POWER	39	OVERWINTERING WHIRLIGIGS	35
DREDGING EXPERIENCE IN POLAND	37	POLISH LAKE FAUNA	41
<i>DYTISCUS DIMIDIATUS</i> DIET	36	RUSSIAN <i>ENOCHRUS (LUMETUS)</i>	36
<i>DYTISCUS MARGINALIS</i> VS NEWT	36	RUSSIAN FAR EAST	42
EVOLUTION IN UNDERGROUND ISLANDS	42	SARATOV BEETLES	34
FLUKE UPDATE	34	<i>STERNOPRISCUS</i> LARVAE	36
FRENCH ALPS	26	TERRESTRIAL HYDRAENIDS IN TANZANIA	43
FRENCH GUIANA	37	THRACIAN RECORDS	42
GEORGIAN <i>SPHAGNUM</i> BOG	33	TROUT DIET - AN APPARENTLY OVERLOOKED STUDY BY DAVID SHARP	28
GYRINIDAE IN CHINA	34	UMBRIAN CATALOGUE	32
HEAT TOLERANCE ABOVE AND BELOW GROUND	43	WALKING UNDER WATER	26
Obituaries		PETER HAMMOND 1941-2021	40
THOMAS HEYSHAM 1791-1857	30	COLIN JOHNSON 1943- 2021	41
Meetings and webinars		STILL NO SIGN OF ANY!	