

Max Planck Society

News Release

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Embargoed lifted

Max-Planck Doctoral Student discovers "living fossils"

Example of an unknown insect order found in Namibia, and shortly before in a piece of 45 million-year-old amber

For the first time in 87 years scientists have found insects which cannot be allocated to any known insect order. During an international entomologist group expedition from Germany, England, South Africa, Namibia and the USA to the Brandberg mountain in Namibia, the predatory animals were discovered: they appear to be something like a mixture between a stick insect and a preying mantis and have been given the provisional name "Gladiator". Prior to this, Oliver Zompro, a member of the expedition and doctoral Student at the Max-Planck-Institute for Limnology in Plön, discovered this life form in a 45-million-year-old piece of amber and in not yet classified pieces of amber from various European museums. The new insect order will be presented in the 18th April 2002 edition of *Science*. According to entomologists such as Piotr Naskrecki, director of the "Invertebrate Diversity Initiative" in the species protection organisation, "Conservation International", this discovery is akin to "finding a mammoth or a sabre-toothed tiger today". This new order, christened *Mantophasmatodea*, brings the number of insect orders known throughout the world to 31.

Insects, (Latin insectum, literally "segmented animal"), with over 1.2 million known species, represent over 80 % of all living animals on earth. Every year numerous new species are found and categorised. But the last time a new insect order was discovered was in 1915, 87 years ago.

The discovery

Oliver Zompro, biologist and doctoral Student in the Tropical Ecology Working Group at the Max-Planck-Institute for Limnology in Plön, (supervisor Prof. Dr. Joachim Adis), discovered several animals which could not be allocated to any known insect order, as well as a new family of stick insect (*Archipseudophasmatidae*) when examining a 45-million-year-old piece of Baltic amber last year. The specimens came

Max Planck Society
for the Advancement of Science
Press and Public Relations
Department

Hofgartenstrasse 8
D-80539 Munich

PO Box 10 10 62
D-80084 Munich

Phone: +49-89-2108-1276
Fax: +49-89-2108-1207

E-mail: presse@mpg-gv.mpg.de
Internet: www.mpg.de

Person responsible for contents:
Dr. Bernd Wirsing (-1276)
Mobile: +49 - 1 71 - 8 14 24 94

Executive Editor:
Dr. Andreas Trepte (-1238)

Biology, Medicine:
Dr. Christina Beck (-1306)
Walter Frese (-1272)

Chemistry, Physics, Technology:
Eugen Hintsches (-1257)
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from the amber collection of the Geological-Palaeontological Institute of the University of Hamburg, the Palaeontological Institute of the Berlin Museum for Natural History and from numerous private collections. On visiting the British Natural History Museum in London, Oliver Zompro was shown a spiny insect that had been collected in 1950 in Tanzania. It had been sent to the British museum 16 years earlier by the Museum in Lund/Sweden to be identified. Another completely transparent piece of amber that Zompro had been given to examine from the private collection of Friedrich Kernegger, contained an adult male (subsequently described as *Raptophasma kerneggeri* Zompro, 2001 in *Mitt. Geol.-Paläont. Inst. Univ. Hamburg* 85: 229-261, 2001). There was a striking similarity with the animal in London. Zompro eventually found a similar-looking adult female in unidentified stick-insect material in the Berlin Museum for Natural History, which was found in Namibia at the beginning of the 20th century. Comparisons with the animal in amber demonstrated: for the first time since the discovery of *Zoraptera* in 1913 and the *Grylloblattodea* (= *Notoptera*) in 1915, a new insect order had been discovered.



Figure 1: *Raptophasma kerneggeri* Zompro, 2001 in Baltic amber, the oldest representative of the new insect order Mantophasmatodea

(Photo © O. Zompro, MPIL Plön, Germany)

The German postdoctoral scholarship-holder Dr. Klaus-Dieter KLASS and Prof. Dr. Niels Peder KRISTENSEN from the Zoological Museum in Copenhagen, co-authors of the "Science" article, provided support in investigating the structure (morphology, anatomy) and in describing how the animal is distinct from previously known insect orders. Their detailed examinations confirm without any doubt that the animal represents a previously unknown insect order. However, its exact position within the system of insects has not yet been clarified. The species found in the museum represent the genus *Mantophasma* (body length up to 2.5 cm), the animals in amber the genus *Raptophasma* (body length 1.5 cm).

There were approximately 40 eggs in the abdomen of the female from Namibia which was conserved in alcohol (Museum for Natural History, Berlin). Initial electron microscopic investigations of their surface structure, carried out by Joachim Adis at the Max-Planck-Institute for Limnology, indicate that they are supplied with air under water in the event of temporary flooding, i.e. they are submersion-resistant by means of "plastron respiration" and/or they have a high level of resistance to desiccation. Cuticular remains of other insects were found in the intestines of this female, which, as in the case of the species conserved in amber, indicate a predatory diet. Rows of spines on the front and middle legs indicate that the animal held on to its prey with its legs, as some insect-eating locusts (*Orthoptera*) do.

A more detailed description of the new insect order "*Mantophasmatodea*" will appear in the autumn in the journal "*Zoologischer Anzeiger*". At the end of the year a German account will be published in a new edition of "*Kästner – Lehrbuch der Speziellen Zoologie*", the entomological standard work.

Joachim Adis sent photographs of the two animals found in museums to scientists and museums around the world, with the request for searches in collections for further material. Dr. Eugène Marais, National Museum in Windhoek, sent the researchers information about two similar-looking animals that had been found in Namibia in 1990 and 2001. The two specimens which were sent to Plön represented two further new species of a third new genus and, at the same time, confirmed that representatives of the new insect order had survived to the present day – over a period of at least 45 million years.

Research expedition to the Brandberg



Figure 2: *The Brandberg in Namibia – home of the „Gladiator”*

(Photo © Thomas Kujawski/ASA-Multimedia, Flintbek, Germany;
kujawski@asa-multimedia.de)

In January 2002, a scientific cooperation agreement was signed between the Namibian National Museum in Windhoek and the Max-Planck-Institute for Limnology (Tropical Ecology Working Group; headed by Prof. Dr. W.J. Junk) in Plön, in which the Namibian government gave the two partners to the agreement exclusive rights to research and document the new insect order for a period of 6 years. The main aims of the research are to study the biology, ecology, occurrence, genetics, evolution and in particular the protection of the insects. This involves, amongst other things, developing a collection of newly described species in the museum in Namibia and the distribution of specimens to selected museums on all continents, training Namibian students in handling the animals in the field and in the laboratory, cooperation with internationally renowned scientists with the aim of producing joint publications of the results achieved and the organisation of third-party funds to finance further research.



Figure 3 Biotope of the „Gladiator” on the Brandberg in Namibia

(Photo © Thomas Kujawski/ASA-Multimedia,
Flintbek, Germany;
kujawski@asa-multimedia.de)

The first scientific expedition to Namibia took place from 28th February to 19th March 2002 in order to look for a species, not yet described – working name "Gladiator", so called because of its similarity to the armoured combatants in the film of the same name - on the Brandberg mountain in Erongo province. The nearly 2,600 m high Inselberg has long been famous for the animal species which only occur here. The Brandberg region is a Namibian National Park and there are plans to propose it for UNESCO's World Heritage programme because of the unique rock drawings found there. The area may be entered only with permission, which is particularly important for the protection of the new insect order from bio-piracy. It turned out that scientists from the University of Leeds and the Windhoek Museum had already found specimens of this insect species on the Brandberg during joint expeditions between 1998 and 2000. The

international team was also successful in finding living animals in 2002, not only on the Brandberg, but also in the Erongo mountains, where they found a further species of the order.



Figure 4: Nymph of the „Gladiator“ on the Brandberg in Namibia

(Photo © Thomas Kujawski/ASA-Multimedia, Flintbek, Germany;
kujawski@asa-multimedia.de)

The "Gladiators" collected in the region around the Brandberg are now in the climate chambers of the Max-Planck-Institute for Limnology. First DNA analyses are already being undertaken in the molecular biology laboratories of the University of Leeds in England (Prof. R. BUTLIN) and Brigham Young University in Provo, USA (Dr. M.F. WHITING), in order to clarify the exact position of the *Mantophasmatodea* order in the insect family tree.

Videoclip: "Gladiator" - a new insect Order (99 sec.) by Joachim Adis & Kurt Hirschel, 4/2002;
 © Adis@mpil-ploen.mpg.de & K_Hirschel@t-online.de)

Original publications:

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Zompro, O., Adis, J. & Weitschat, W. 2002. A review of the Order Mantophasmatodea (Insecta). Zool. Anz., in print

Information in the Internet:

<http://www.sungaya.de/mantophasmatodea>

<http://www.mpil-ploen.mpg.de/mpiltcop.htm>

Further information via:

Prof. Dr. Joachim Adis (<http://www.mpil-ploen.mpg.de/mpiltjad.htm>)

& Dipl.-Biol. Oliver Zompro

Max-Planck-Institute for Limnology (<http://www.mpil-ploen.mpg.de/english/index.htm>)

Tropical Ecology Working Group (<http://www.mpil-ploen.mpg.de/mpiltalg.htm>)

August-Thienemann.Str. 2

24306 Plön

Tel.: +49 (0) 45 22 / 7 63 – 2 62

Fax: +49 (0) 45 22 / 7 63 – 2 81

Email: adis@mpil-ploen.mpg.de

Email: o.zompro@t-online.de