MAIISG NEWSLETTER

Number 9, December 2023

HI MAIISG MEMBERS

After a long period of silence, we bring you the 2023 newsletter.

In this issue, Yeray Monasterio talks about the action plan for the Laurel forest Pollinators in the Canary Islands, while António Franquinho Aguiar tells us more about the impact of the populations of Lewis Spider Mite in mainland Portugal and Madeira Island.

António Frias Martins reflects on the impact of climate change on the snail diversity in the Azores and the description of new snail species for science. Klaus Groh and Marco Neiber talk about the *Canariella hispidula* complex from Tenerife Island (Canaries) and their impact on conservation.

Paulo Borges shares the new publications on the Arthropods from the Azores, and Dinarte Teixeira updates the Desertas snails conservation project.

Also included are the contributions of our members that weren't shared in the December 2022 newsletter.

We hope you enjoy the 2023 newsletter edition.

Vicky, Paulo and Dinarte

NEW NAME FOR OUR SPECIALIST GROUP

By Vicky Wilkins

MAIISG has some news, we are no longer to be called MAIISG, we are dropping the 'M'.

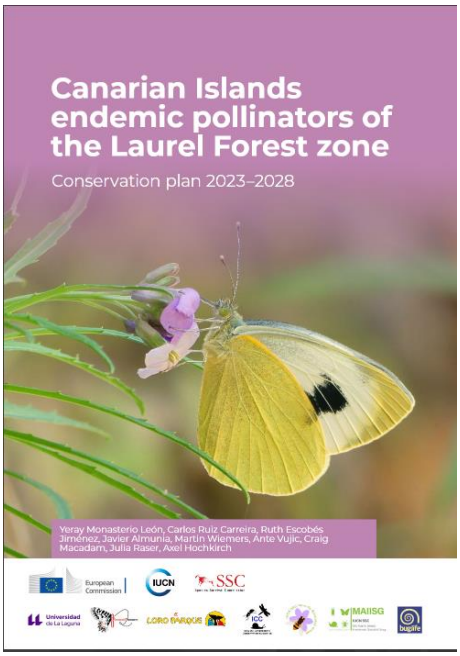
The Exec has had a number of requests from invertebrate specialists and conservationists from other islands wanting to join the group. They are keen to collaborate, build on our successes and jointly work to conserve island invertebrates. As a result, we are expanding the group to include all Atlantic Islands. We already have confirmed specialists from a wide range of islands, from South Georgia to a large number of the West Indie Islands. So we will now be the "Atlantic Islands Invertebrate Specialist Group"!

We still have some administration to do, including updating the website, logo and some of the IUCN systems. As well as welcoming our new members, and start to include them in the newsletter, red listing and conservation projects. So, a very exciting start to 2024 for AIISG and all its members, both new and old!

"We will now be the "Atlantic Islands Invertebrate Specialist Group!'

CANARIAN ISLANDS ENDEMIC POLLINATORS OF THE LAUREL FOREST ZONE CONSERVATION PLAN 2023–2028

By Yeray Monasterio



In April 2021, the European Commission tasked the International Union for Conservation of Nature (IUCN) with developing specific action plans for Europe's most threatened pollinator species.This ambitious project was carried out with the IUCN's Species Survival Commission, the Committee for the Conservation of Invertebrates, the Hoverfly Specialist Group, and Buglife. These plans, published in May 2023, aim to determine the conservation status of threatened species, identify their main threats, define the level of existing knowledge, and outline an action pathway to improve their populations. This process involved experts, nature conservation organisations, universities, and local and governmental authorities in a series of collaborative workshops that allowed the creation of comprehensive documents with valuable global insights.

Several members of the MAIISG group, including Yeray Monasterio (ZERYNTHIA Association), Martin Wiemers (BCE) (Lepidoptera experts) and Carlos Ruiz (bees expert), were deeply involved in the development of the action plan for threatened pollinators native to the Canary Islands' laurel forest. Their participation as experts in their respective fields significantly contributed to the process.

The laurel forest is a unique habitat, currently exclusive to the western Canary Islands, and is in a precarious state of conservation, as are much of its associated fauna and flora. The outcome of the plan was a document titled "Canarian Islands Endemic Pollinators of the Laurel Forest Zone Conservation Plan 2023–2028," which established the challenges we must assume to improve the conservation status of two butterflies, a bee and a hoverfly endemic to this fascinating archipelago.

- **Presentation of the three action plans**: https://wikis.ec.europa.eu/display/EUPKH/Action+Plans
- **Action Plan for Laurel Forest Pollinators**: https://op.europa.eu/en/publication-detail/-/publication/81542e9b-f9e8-11ed-a05c-01aa75ed71a1/language-en

> *"This ambitious project was carried out in collaboration with the IUCN's Species Survival Commission, the Committee for the Conservation of Invertebrates, the Hoverfly Specialist Group, and Buglife."*

THE LEWIS SPIDER MITE, *EOTETRANYCHUS LEWISI*: AN EMERGING PEST OR JUST ANOTHER ALIEN MITE?

By António Franquinho Aguiar

The project EXPL/ASP-AGR/0082/2021, FCT funded, entitled "The Lewis spider mite, *Eotetranychus lewisi*: an emerging pest, or just another alien mite?". Led by INIAV (Oeiras, Portugal) with associates DRA (Madeira, Portugal) and INRAE-CBGP (Montpelier, France), it was started in January 2022.

The very recent detection of the Lewis spider mite in the Algarve, southern Portugal, could represent an additional problem for cultivated crops, as this mite is highly polyphagous, feeding on more than 75 plant species of 28 botanical families, including many economically important crops (Figure 1). The present exploratory research project intends to perform an initial assessment of this newly established population and critically compare the recent Algarve population with the long-established Madeira population by identifying the most important plant hosts (including uncultivated and agricultural plants), assessing the damages and evaluating the population levels on selected crops.

References published results so far:

NAVES, P., AGUIAR, A.M.F., SANTOS, M., NÓBREGA, F., VARELA, A.R., MIGEON, A. NAVIA, D. & AUGER, P., (2023). Two new alien Eutetranychus mites (Prostigmata, Tetranychidae), for Madeira Island, Portugal. Acarologia 63 (4): 1154-1162. https://doi.org/10.24349/t82c-9sz9

SANTOS, M., NAVES, P., AGUIAR, A.M.F., MIGEON, A., NAVIA, D. & AUGER, P. (2023). Updated distribution of *Eotetranychus lewisi* (McGregor, 1943) in mainland Portugal and Madeira Island and main host plants. Proceedings of the XII ECE European Congress of Entomology, 16-20 October 2023, Heraklion, Greece [Poster]

"The present exploratory research project intends to perform an initial assessment of this newly established population, and critically compare the recent Algarve population with the long-established Madeira population."

REVISION OF THE LAURIIDAE STEENBERG, 1925 (GASTROPODA:STYLOMMATOPHORA: PUPILLOIDEA) ON THE AZORES ISLANDS, WITH THE DESCRIPTION OF SEVEN NEW SPECIES

By António Frias Martins

A revision of the Lauriidae Steenberg, 1925 unvails a high level of endemism in the Azores, where five of the seven known species from the archipelago are endemic.

A survey of the land molluscs collection of the Department of Biology of the University of the Azores has also yielded an additional seven new species described for five Azorean Islands: *Lauria elongata* n.sp., *Leiostyla maiuscula* n.sp. and *Leiostyla minuscula* n.sp. from Flores and Corvo; Leiostyla pomboi n.sp. and Leiostyla elegans n.sp. from Santa Maria; *Leiostyla reginae* n.sp. from São Jorge; *Leiostyla picarota* n.sp. from Pico (Figure 2). The morphology and the anatomy were studied and illustrated for each species. Remarks were added on the distribution, abundance, and possible disappearance of some species, particularly in Santa Maria Island.

Figure 2. A-F, *Leiostyla fuscidula*: A, (SMG56a); B, (SMA31b); C, (TER07); D, (TER19); E, (GRA08); F, (SJO05). G, *Leiostyla reginae* n.sp. (SJO05). H, *Leiostyla* cf. *picarota* n.sp (PIC06). bs, black spot.

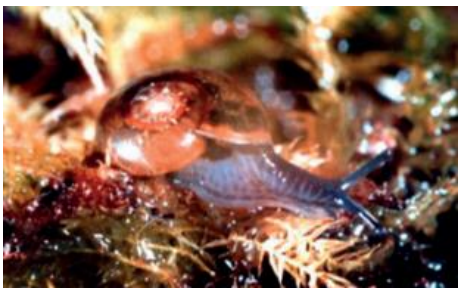
Reference:

MARTINS, A.F. (2023). Revision of the Lauriidae Steenberg, 1925 (Gastropoda:Stylommatophora) on the Azores Islands, with the description of seven new species, Açoreana 11(4): 673-750.

"The revision of the Lauriidae Steenberg 1925 has unveiled seven additional new species which were described in Martins (2023). "

THE AZOREAN ENDEMIC SNAILS ARE DISAPPEARING! WHO IS TO BLAME?

By António Frias Martins and colaborators



About 50 years of land snail collections are stored in the Reference Collection of the Department of Biology of the University of the Azores (DBUAç-MT); this timeframe was used to investigate changes in abundance and to search for possible causes of variation. Unfortunately, the methodology employed during the various collecting missions (selective search for endemics and handpicking the specimens) does not allow for formal statistical treatment of the relative abundances through time within the malacofauna. Yet, by biasing the search effort towards endemic species, such a collecting approach has shown more convincingly a tendency for decline among these species, accentuated in the last 20 years.

Focus on the endemics, rather than the overall malacofauna, is justified by their supposed lower resilience to habitat change due to narrow niche adaptation, as compared with the non-endemic, mostly introduced malacofauna, often with broad habitat tolerances with respect both to climate and anthropogenic disturbance (Figure 3). The details of this study reveal an alarming trend toward the extinction of these endemics. Analysis of meteorological parameters (air temperature, precipitation, relative humidity) has provided evidence for climatic change and inspection of land use through the years has shown extensive habitat fragmentation, increase in secondary forest and spread of invasive species. It is suggested that climate change and habitat destruction, coupled with introduced plant and animal invaders, are responsible for the demise of many endemic snail species.

To counteract this extinction trend, the project LIFE SNAILS NAT/PT001377 was set in motion in Santa Maria, aiming at habitat restoration in the protected area of Pico Alto, once the hottest endemic spot of the island. It is still too soon to expect results.

Reference:

MARTINS, A.F., HENRIQUES, D.M. & CAMERON, R.A.D (2023). The Azorean endemic snails are disappearing! Who is to blame?. Açoreana, 11(4): 653-672.

"A tendency for decline among endemic species, accentuated in the last 20 years, has been convincingly shown by this study."

MAKE SEVEN OUT OF ONE - WHAT ARE THE CONSEQUENCES FOR ASSESSING THE THREATS OF TAXA?

By Klaus Groh and Marco T. Neiber

Recently, the *Canariella hispidula* complex from the island of Tenerife (Canary Islands) was revised (Groh & Neiber 2023) and as a result, of the nine nominal taxa of this complex, six species and one subspecies were recognised, and one of them was described as new. Previously, these taxa were (Alonso & Ibáñez 2015; Biota Canarias 2023; MolluscaBase 2023) - contrary to other opinions (e.g., Bank & al. 2002, Neubert & al. 2019 a, b) - only considered as two species or even as just one species with one subspecies, *Canariella hispidula* (Lamarck, 1822) and *C. leprosa* (Shuttleworth, 1852), respectively *C. hispidula leprosa*.

A possible underestimation of diversity must be viewed critically because the taxonomy and nomenclature currently provided in MolluscaBase is considered binding for the evaluation of taxa at species level in the European Red List of terrestrial molluscs of the International Union for Conservation of Nature (IUCN: https://www.iucnredlist.org), which is currently being updated. Taxa not mentioned there therefore can't be assigned to an appropriate category of extinction risk. The motivation for the actual revision was therefore to substantiate the – in the opinion of the authors – species status of such taxonomically undervalued taxa on the basis of the available published data and to stimulate further research on this still insufficiently known family.

Taking into account all available information on distribution, conchology and anatomy (main sources: Ponte-Lira 1992, Ibáñez & al. 1995), as well as the study of the types of all nominal taxa and material in museum collections and from our own collections, the taxonomic and nomenclatoric consequences for the *Canariella hispidula* complex on Tenerife are as follows:

Canariella hispidula [syn. = *Helicodonta salteri* Gude, 1911], *C. b. berthelotii* (d'Orbigny, 1836) [syn. = *Helix fortunata*, Shuttlworth, 1852], *C. berthelotii beata* (Wollaston, 1878), *C. lanosa* (Mousson, 1872), *C. subhispidula* (Mousson, 1872) and the new described *C. hartmuti* (Groh & Neiber, 2023) [syn. = invalid *Helix bertheloti* Férussac, 1835 sensu Ibáñez & al. 1995] are considered to belong to the nominate subgenus *Canariella* s.s., whilst two additional species, *C. everia* (Mabille, 1882) and *C. leprosa* probably have to be placed in two different subgeneric groups, which are as yet not scientifically named. These accepted taxa are shown in Figure 4, presented by holo- or lectotypes in comparable scale. Their known distribution ranges are shown in Figure 5.

The distribution patterns, as well as anatomical and shell characters suggest that most of these taxa are distinct species rather than subspecies of a single or few species. Their distribution ranges overlap and up to three taxa can occur in the same 1 km². It is also clear that the distribution areas of individual taxa are significantly smaller than the entire range of the species complex. The maximum secured number of occupied 1 × 1 km squares (AOO) is 39 (*C. hartmuti*), the lowest is 12 (*C. leprosa*). The smallest extent of occupancy (EOO) of a taxon is around 15 km² only (*C. subhispidula*), the largest is around 300 km² (*C. hartmuti*). This clearly shows the sensitivity to existing and potential threats of individual taxa with small distribution ranges. This applies, for example, *to C. subhispidula*, whose entire area could be completely destroyed by a large forest fire alone, even worse on the basis of subspecies. For example, the small range of *C. b. berthelotii* only covers about 12 km² within which 7 1 × 1 km squares are occupied, all of which suffer from several threats. Therefore, in new assessments, it will be necessary to critically evaluate the newly defined taxa and their distribution ranges. The same applies to species belonging to other endemic genera of

the Canary Islands such as *Pomatias*, *Monilearia* or *Hemicycla*, for which revisions for individual islands or the entire archipelago are still pending.

Figure 4: Comparison of valid taxa of the *Canariella hispidula*-complex from Tenerife. A. *Canariella* (C.) *hispidula* (Lamarck, 1822), Lectotype of *Carocolla hispidula* Lamarck, 1822, MHNG MOLL-51125-2, 13.5 mm, photographs Emmanuel Tardy, MHNG; B. *C.* (C.) *b. berthelotii* (d'Orbigny, 1836), Lectotype of *Helix fortunata* Shuttleworth, 1852, NMBE 18936, 12.8 mm, photographs Eike Neubert, NMBE; C. C. (C.) *berthelotii beata* (Wollaston, 1878), Holotype of *Helix* (*Gonostoma*) *beata* Wollaston, 1878, NHM UK 1895.2.2.30, 11.6 mm, photographs Kevin Webb, NHM; D. C. (subgen. indet.) everia (Mabille, 1882), Lectotype of *Helix everia* Mabille, 1882, MNHN-IM-2000-28851, 10.4 mm, photographs Melanie Van Weddingen, MNHN; E. *C.* (C.) *hartmuti* Groh & Neiber, 2023, Holotype, TFMC MT 3577a, Barranco del Agua, 11.35 mm, photographs María Esther Martín González, TFMC; F. *C.* (subgen. indet.) *leprosa* (Shuttleworth, 1852), Holotype of *Helix leprosa* Shuttleworth, 1852, NMBE 506131, 8.6 mm, photographs Eike Neubert, NMBE; G. *C.* (*C.*) *subhispidula* (Mousson, 1872), Lectotype of *Helix hispidula* var. *subhispidula* Mousson, 1872, ZMZ 508663, 9.6 mm, photographs Eike Neubert, NMBE. Scale = 5 mm.

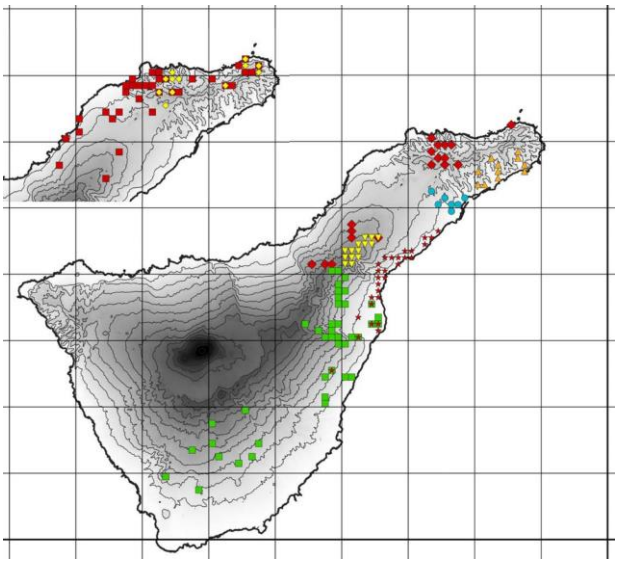


Figure 5: Distribution of valid taxa of the *Canariella hispidula*-complex on Tenerife. Insert: *Canariella* (subgen. indet.) *everia* (red squares) and *C.* (subgen. indet.) *leprosa* (yellow diamonds); Main map: *Canariella* (*Canariella*) *hispidula* (red stars), *C.* (*C.*) *lanosa* (red diamonds), *C.* (*C.*) *subhispidula* (yellow triangles), *C.* (*C.*) b. *berthelotii* (blue dots), *C.* (C.) *berthelotii beata* (orange triangles) and *C.* (*C.*) *hartmuti* (green squares). Grid = 10 × 10 km UTM, single symbols = 1 × 1 km UTM.

Literature cited:

Alonso, M.R. & Ibáñez, M. (2015) Las especies de la Familia Canarellidae Schileyko, 1991 (Mollusca, Gastropoda, Stylommatophora, Helicoidea) de las islas Canarias. Vieraea 43: 127–153. Available at: https://www.researchgate.net/publication/292061820_Las_especies_de_la_familia_Enidae_B_BWoodward_1903_1880_Mollusca_Gastropoda_Stylommatophora_de_las_islas_Canarias_el_genero_*Napaeus*_Albers_1850

Bank, R.A., Groh, K. & Ripken, T.E.J. (2002) Catalogue and bibliography of the non-marine Mollusca of Macaronesia. Pp. 89–235, 13 pp. explanations to 13 pls in: Falkner, M., Groh, K. & Speight, M.C.D. [Eds] Collectanea Malacologica, Festschrift für Gerhard Falkner. Hackenheim & München: ConchBooks & Verlag der Friedrich-Held-Gesellschaft.

Biota Canarias (2023): https://www.biodiversidadcanarias.es/biota [accessed 21.xii.2023]

Groh, K. & Neiber, T.M. (2023): Critical review of the current taxonomic evaluation of the taxa of the *Canariella hispidula* complex from the Canary Island of Tenerife (Gastropoda, Stylommatophora, Canariellidae). Archiv für Molluskenkunde 152 (2): 217-237. Available at: https://doi.org/10.1127/arch.moll/152/217-237

Ibáñez, M., Ponte-Lira, C.E. & Alonso, M.R. (1995) El género *Canariella* Hesse, 1918, y su posición en la familia Hygromiidae (Gastropoda, Pulmonata, Helicoidea). Malacologia 36: 111–137.

MollusaBase (2023): https://www.molluscabase.org [accessed 21.xii.2023]

Neubert, E., Seddon, M.B., Allen, D.J., Arrébola, J., Backeljau, T., Balashov, I., Bank, R., Cameron, R., de Frias Martins, A.M., De Mattia, W., Dedov, I., Duda, M., Falkner, G., Falkner, M., Fehér, Z., Gargominy, O., Georgiev, D., Giusti, F., Gómez Moliner, B.J., Groh, K., Hallgass, A., Holyoak, D.T., Ibáñez, M., Kappes, H., Killeen, I., Manganelli, G., Martínez-Ortí, A., Menez, A., Moorkens, E., Mylonas, M., Nardi, G., Neiber, M.T., Páll-Gergely, B., Parmakelis, A., Prié, V., Reischütz, A., Rowson, B., Slapnik, R., Son, M., Štamol, V., Teixeira, D., Triantis, K., Vardinoyannis, K., von Proschwitz, T. & Walther, F. (2019a) European Red List of terrestrial Molluscs. Brussels: IUCN. Available at: http://www.iucnredlist.org/initiatives/europe/publications

Neubert, E., Seddon, M.B., Allen, D.J., Arrébola, J., Backeljau, T., Balashov, I., Bank, R., Cameron, R., de Frias Martins, A.M., De Mattia, W., Dedov, I., Duda, M., Falkner, G., Falkner, M., Fehér, Z., Gargominy, O., Georgiev, D., Giusti, F., Gómez Moliner, B.J., Groh, K., Hallgass, A., Holyoak, D.T., Ibáñez, M., Kappes, H., Killeen, I., Manganelli, G., Martínez-Ortí, A., Menez, A., Moorkens, E., Mylonas, M., Nardi, G., Neiber, M.T., Páll-Gergely, B., Parmakelis, A., Prié, V., Reischütz, A., Rowson, B., Slapnik, R., Son, M., Štamol, V., Teixeira, D., Triantis, K., Vardinoyannis, K., von Proschwitz, T. & Walther, F. (2019b) Supplementary Material to the European Red List of terrestrial Molluscs. Cambridge, UK: IUCN. Available at: https://portals.iucn.org/library/node/48439 .

Ponte-Lira, C.E. (1992) La subfamilia Ciliellinae (Mollusca Gastropoda: Hygromiidae) en el archipelago Canario. Unpublished doctoral thesis, Universidad de La Laguna.

> “The *Canariella hispidula* complex from the island of Tenerife (Canary Islands) was revised (Groh & Neiber 2023), and as a result, of the nine nominal taxa of this complex, six species and one subspecies were recognised, and one of them was described as new.”

NEW PUBLICATIONS ASSOCIATED WITH THE MAIISG AFFILIATION

By Paulo Borges

Our affiliation was recently associated with several publications related to arthropod monitoring in the Azores linked with the project LIFE-BEETLES (https://www.lifebeetlesazores.com/en/):

- Tsafack, N., Lhoumeau, S., Ros-Prieto, A., Navarro, L., Kocsis, T., Manso, S., Figueiredo, T., Ferreira, M.T. & Borges, P.A.V. (2023). Biological Integrity of Azorean Native Forests Is better measured in Cold Season. Diversity, 15: 1189; DOI: 10.3390/d15121189. https://www.mdpi.com/1424-2818/15/12/1189

- Tsafack, N., Lhoumeau, S., Ros-Prieto, A., Navarro, L., Kocsis, T., Manso, S., Figueiredo, T., Ferreira, M.T. & Borges, P.A.V. (2023). Arthropod-based biotic integrity indices: A novel tool for evaluating the ecological condition of native forests in the Azores archipelago. Ecological Indicators, 154: e 110592. DOI: 10.1016/j.ecolind.2023.110592 https://www.sciencedirect.com/science/article/pii/S1470160X23007343

- Lhoumeau, S. & Borges, P.A.V. (2023). Assessing the Impact of Insect Decline in Islands: Exploring the Diversity and Community Patterns of Indigenous and Non-Indigenous Arthropods in the Azores Native Forest over 10 Years. Diversity, 15: 753. DOI: 10.3390/d15060753 (IF2022: 2.4; Q2 Biodiversity Conservation). https://www.mdpi.com/1424-2818/15/6/753

- Tsafack, N., Pozsgai, G., Boieiro, M., Ros-Prieto, A., Nunes, R., Ferreira, M.T. & Borges, P.A.V. (2023). Edge effects constrain endemic but not introduced arthropod species in a pristine forest on Terceira (Azores, Portugal). Forest Ecology and Management, 528: e120646. DOI: 10.1016/j.foreco.2022.120646 https://www.sciencedirect.com/science/article/pii/

"Land-use change and biological invasions are key threats to the native malacofauna, but not knowing the exact consequences of human activities makes it hard to establish conservation priorities for this group."

DESERTAS SNAILS: READY FOR THE TRIAL RELEASE TESTS

By Dinarte Teixeira and collaborators

We are glad to share that the "*Help Desertas Snails project*," which aims to rescue four endemic Desertas land snail species from extinction, has reached a new milestone.

Starting in Spring 2024, we will initiate the trial release tests in Bugio (Desertas Islands) based on the specimens delivered by the successful captive breeding program implemented (Figure 6).

It results from a two-year effort between IFCN, Mossy Earth, Chester, Bristol and Beauval Nature Zoos, and we will be sharing the results in future newsletters.

"IFCN and the project partners will conduct a trial release test for species reintroduction in the Desertas Islands in Spring 2024."

CONTRIBUTIONS FROM DECEMBER 2022…

ADVANCES WITH ENDEMIC, NATIVE AND INVASIVE ARTHROPODS SPECIES IN MADEIRA ARCHIPELAGO

By António Miguel Franquinho

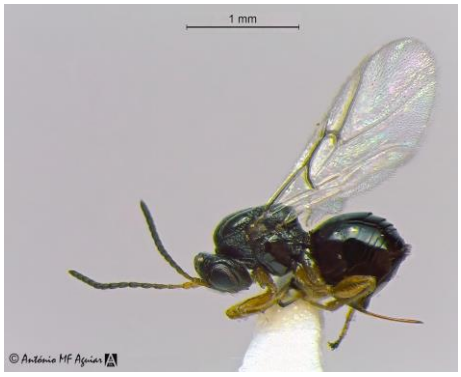
There is consensus on the importance attributed to the study of endangered native and endemic species, as well as the study of invasive species, due to the threat that many represent to natural ecosystems, in competition with native species and also in ecosystems modified by man (agricultural and forestry), the threat that some pose to economically and culturally important crops.

This year, several studies were carried out and results published on invasive leafhoppers in Madeira Island. Bella et al. (2022) inform of a new Asian leafhopper *Hishimonus diffractus* (Hemiptera: Cicadellidae), originally from China and Thailand, which was found in Europe (France, Spain, Gibraltar, UK, Italy and Madeira). Although this species has been foud in several plants of different families, in Madeira it has been mainly collected associated with grapevine. For more information, please consult:

BELLA, S., AGUIN-POMBO, D., AGUIAR, A.M. Franquinho, KUNZ, G., MIRALLES-NÚÑEZ, A., FOSTER, S., SÁNCHEZ-GARCÍA, I., WILSON, M.R. & D'URSO, V. (2022). The discovery of *Hishimonus diffractus* Dai, Fletcher & Zhang 2013 (Hemiptera: Auchenorrhyncha: Cicadellidae) in Europe, with remarks on other species of the genus now established. Zootaxa, 5159 (4): 558-570. 10.11646/zootaxa.5159.4.5

Another important invasive species is the two-spotted leafhopper *Sophonia orientalis*. This also Asian cicadelid was discovered in Madeira in 2000 and since has successfully spread to the Canary Islands, Azores and the Iberian Peninsula. Aguin-Pombo et al. (2022) have demonstrated that besides the shown polyphagy of this invasive species, in Madeira it is successfully breeding in vineyards, where it develop huge populations. Knowing that the main disease vectors in vineyards are introduced leafhoppers, we could be facing a major threat to European vineyards. More information in:

AGUIN-POMBO, D., AGUIAR, A.M. Franquinho, CRAVO, D., MIRALLES NUÑEZ, A., LUQUE ARNAU, N. VALERO, P. & SABATÉ, J. (2022). The two-spotted leafhopper, Sophonia orientalis (Hemiptera: Cicadellidae): a new threat for European vineyards. Applied Entomology and Zoology. https://doi.org/10.1007/s13355-022-00802-9; https://rdcu.be/cZVkM



In 2014, an invasive cynipid wasp, the Chestnut-gall-wasp, *Dryocosmus kuriphilus* (Hymenoptera: Cynipidae), was detected in Madeira. Originally from China, this species has spread across continents, including Europe, in recent years. Chestnut production in Madeira is locally very important, which prompted Regional Authorities to implement a Biological Control Program based on the introduction of a specific parasitoid of the gall-wasp. Aguiar et al. (2022) describe all the phases: the worl spread of the pest, his discovery in Madeira, the importation and releases of the specific parasitoid and the results obtained so far regarding its control. Please find more information in:

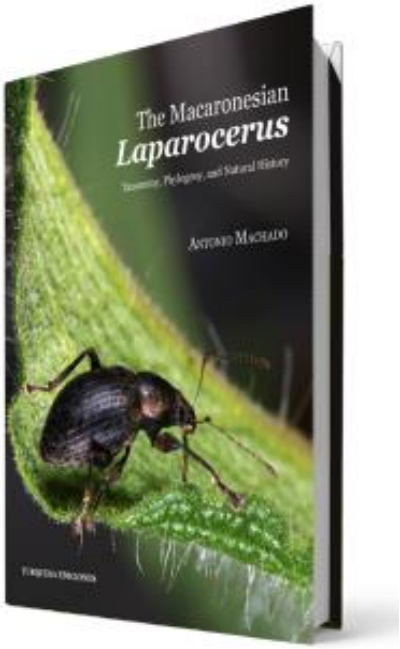
AGUIAR, A.M. Franquinho, CRAVO, D.,DANTAS, L.M.F. & LUZ, T.M.V. (2022). The Oriental chestnut gall-wasp *Dryocosmus kuriphilus Yasumatsu*, 1951, (Hymenoptera: Cynipidae) and its introduced and native parasitoids in Madeira Island, Portugal, with notes on some other parasitic Hymenoptera reared from gall samples. Entomologist's Monthly Magazine, 158 (3): 175-190. 10.31184/M00138908.1583.4143

"There is consensus on the importance attributed to the study of endangered native and endemic species, as well as the study of invasive species, due to the threat that many represent to natural ecosystems, in competition with native species and also in ecosystems modified by man (agricultural and forestry).), the threat that some pose to economically and culturally important crops."

THE MACARONESIAN *LAPAROCERUS*: CHAMPIONS OF BIODIVERSITY

By António Machado

Why are there so many *Laparocerus*? The swarm of 261 species and subspecies in Madeira, Salvages and the Canary Islands is the result of a blend of adaptive and non-adaptive evolution in old volcanic archipelagos. These have plenty of environmentally dissected islands subject to a dynamics of construction and deconstruction. A twenty year-long prospection and a DNA phylogenetic analysis reveal their monophyly, internal relationships, and plausible pathways of colonisation, which started in the late Miocene.



Within a timeframe of about 9 million years, sequential radiation events have generated several monophyletic groups, 25 in total, that have been recognised as subgenera of *Laparocerus*. Colonisation routes, habitat shifts, disruption of populations by volcanism, dispersal by massive landslides, and other important factors for speciation are discussed in depth. *Laparocerus* weevils are all flightless and most taxa are exclusive to one single island—seventeen in total—having occupied almost all habitats, from the coastal shrublands to the sclerophyllous woodlands, evergreen cloud-forest, pine woodlands, high-mountain shrublands and the underground environment (volcanic lava-tubes). They thus show an extraordinary morphological and ecological plasticity. Only two species inhabit NW Africa, the nearest continental land, but as a result of a back-colonisation. The richest island is Tenerife (2034 km^2) with 68 species and subspecies. Overall, there is an outstanding ratio of one endemic Laparocerus per 31 km^2, a record not beaten by any other plant or animal genus in Macaronesia.

If oceanic islands have been traditionally considered as laboratories of evolution and species-producing machines, *Laparocerus* will become an ideal model species for broadening research into dispersal and speciation processes of all kinds. Such a group provides a fine-grain picture of nature and evolution at work.

To assist in this endeavour, this book provides a full revision of the genus *Laparocerus*, with descriptions of all 264 species and subspecies —doubling the number previously known—keys for their identification, 374 macro-photographs of the imagos, 50 plates with line-drawings of their genitalia and other internal pieces, and 47 distribution maps (Figure 8).

It also incorporates a detailed anatomical study (13 plates) of one species including preimaginal stages, and chapters dealing with their breeding biology, ecology (food-plants, habitats, etc.), and behaviour. Their natural history, in other words.

The author hopes that in the near future *Laparocerus* will merit sharing the podium with Darwin's finches or *Drosophila* in studies of island evolution.

" Overall, there is an outstanding ratio of one endemic Laparocerus per 31 km^2, a record not beaten by any other plant or animal genus in Macaronesia."

NEW PUBLICATIONS RELATED TO ARTHROPODS CONSERVATION AND IMPACT OF CLIMATE CHANGES IN NATURAL FORESTS OF AZORES

By Paulo Borges

New publications shared:

- Tsafack, N., Pozsgai, G., Boieiro, M., Ros-Prieto, A., Nunes, R., Ferreira, M.T. & Borges, P.A.V. (2023). Edge effects constraint endemic but not introduced arthropod species in a pristine forest on Terceira (Azores, Portugal). Forest Ecology and Management, 528: e120646. DOI: 10.1016/j.foreco.2022.120646
- Lhoumeau, S., Cardoso, P., Boieiro, M., Ros-Prieto, A., Costa, R., Lamelas-Lopez, L. Leite, A., Amorim, I.R., Gabriel, R. Malumbres-Olarte, J., Rigal, F., Santos, A.M.C., Tsafack, N., Ferreira, M.T. & Borges, P.A.V. (2022). SLAM Project - Long Term Ecological Study of the Impacts of Climate Change in the natural forest of Azores: V - New records of terrestrial arthropods after ten years of SLAM sampling. Biodiversity Data Journal, 10: e97952. DOI: 10.3897/BDJ.10.e97952
- Lhoumeau, S., Cardoso, P., Costa, R., Boieiro, M., Malumbres-Olarte, J., Amorim, I.R., Rigal, F., Santos, A.M.C., Gabriel, R. & Borges, P.A.V. (2022). SLAM Project - Long Term Ecological Study of the Impacts of Climate Change in the natural forest of Azores: IV - The spiders of Terceira and Pico Islands (2019-2021) and general diversity patterns after ten years of sampling. Biodiversity Data Journal, 10: e96442. DOI: 10.3897/BDJ.10.e96442
- Stephenson, P., Londoño-Murcia, M.C., Borges, P.A.V., Claassens, L., Frisch-Nwakanma, H., Ling, N., McMullan-Fisher, S., Meeuwig, J.J., Unter, K.M.M., Walls, J.L., Burfield, I.J., Correa, D.C.V., Geller, G.N., Paredes, I.M., Mubalama, L.K., Ntiamoa-Baidu, Y., Roesler, I., Rovero, F., Pal Sharma, Y., Wiwardhana, N.W., Yang, J. & Fumagall, L (2022). Measuring the impact of conservation: the growing importance of monitoring fauna, flora and funga. Diversity, 14, 824. DOI: 10.3390/d1410082
- Borges, P.A.V., Lamelas-Lopez, L., Tsafack, N., Boieiro, M., Ros-Prieto, A., Gabriel, R., Nunes, R. & Ferreira, M.T. (2022). SLAM Project - Long Term Ecological Study of the Impacts of Climate Change in the Natural Forest of Azores: III - Testing the impact of edge effects in a native forest of Terceira Island. Biodiversity Data Journal, 10: e85971. DOI: 10.3897/BDJ.10.e85971
- Borges, P.A.V., Lamelas-Lopez, L., Stüben, P.E., Ros-Prieto, A., Gabriel, R., Boieiro, M., Tsafack, N. & Ferreira, M.T. (2022). SLAM Project - Long Term Ecological Study of the Impacts of Climate Change in the Natural Forest of Azores: II - A survey of exotic arthropods in disturbed forest habitats. Biodiversity Data Journal, 10: e81410. DOI:10.3897/BDJ.10.e81410

"New publications related to arthropods species conservation and climate change in the Natural Forest of Azores."

BUTTERFLY MONITORING ON LA PALMA AND OBSERVATIONS AFTER THE 2021 VOLCANIC ERUPTION

By Yeray Monasterio

In 2022, the ZERYNTHIA Association and the Cabildo de La Palma organised workshops on the Island of La Palma (Canary Islands) to publicise the monitoring of butterflies that takes place on the island. This monitoring is part of a state-wide project of the ZERYNTHIA Association: https://www.asociacion-zerynthia.org/seguimiento-diurnas

The workshops combined theoretical and practical aspects and took place on June 4, 5 and 6, coinciding with the 'World Environment Day'.

The objective of these workshops was twofold. On the one hand, it made possible a meeting between the different people who already participate on the island of La Palma as volunteers to monitor butterflies. On the other, it made it possible to make the project known to the general population, inviting anyone interested to join the team of volunteers.

This training was aimed at both the general population and forest rangers, whose participation is essential.

One of the places visited during these training actions was the area affected by the volcanic eruption that took place in the southwest of the island between September 19 and December 13, 2021. Surprisingly, in just six months, it was already possible to find eggs and larvae of the endemic the Canary blue butterfly *Leptotes webbianus* on the plants that sprouted above the ash level. In an environment hit by hot ash just a few months ago, it was possible to observe most of the butterfly species present on La Palma, surprising even though they were dispersive specimens that were only passing through.

The evaluation of the workshops was very positive, with a large participation of people interested in butterflies who encourage to continue the work started.

"A butterflies monitoring scheme was conducted in La Palma, in a joint initiative from the Cabildo de La Palma and the ZERYNTHIA Association."

FINAL REMARKS

We wish to thank the members who contributed to December 2023 newsletter.

We are excited to see different projects and studies developed in distinct latitudes and addressing different groups of invertebrates. With the enlargement of our group to other Atlantic islands and archipelagos, we encourage old and new members to share the novelties regarding the ongoing invertebrate projects and initiatives.

And remember, starting in 2024, the newsletter will be delivered semesterly, in June and December.

We wish you all a prosperous 2024.

Until next time.

Vicky, Paulo and Dinarte

Image credits:

Figure 1. António Miguel Franquinho

Figure 2. António Frias Martins

Figure 3. António Frias Martins

Figure 4. Klaus Groh & Marco T. Neiber (Groh, K. & Neiber, T.M., 2023)

Figure 5. Klaus Groh & Marco T. Neiber (Groh, K. & Neiber, T.M., 2023)

Figure 6. Dinarte Teixeira

Figure 7. António Miguel Franquinho

Figure 8. António Machado