How to deal with destroyed type material? The case of Embrik Strand (Arachnida: Araneae)

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How to deal with destroyed type material? The case of Embrik Strand (Arachnida: Araneae)

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Abstract. When the museums of Lübeck, Stuttgart, Tübingen and partly of Wiesbaden were destroyed during World War II between 1942 and 1945, also all or parts of their type material were destroyed, among them types from spider species described by Embrik Strand between 1906 and 1917. He did not illustrate type material from 181 species and one subspecies and described them only in an insufficient manner. These species were never recollected during more than 110 years and no additional taxonomically relevant information was published in the arachnological literature. It is impossible to recognize them, so we declare these 181 species here as nomina dubia. Four of these species belong to monotypic genera, two of them to a ditypic genus described by Strand in the context of the mentioned species descriptions. Consequently, without including valid species, the five genera Carteroniella Strand, 1907, Eurypelmaella Strand, 1907, Theumella Strand, 1906, Thiennella Strand, 1907 and Tmeticides Strand, 1907 are here also declared as nomina dubia. Palystes modificus minor Strand, 1906 is a junior synonym of P. superciliosus L. Koch, 1875 syn. nov.

Keywords: nomem dubium, scientific description, scientific illustration, spiders

Species descriptions on the basis of type material is one of the cornerstones of taxonomy. Type material is stored in safe places, usually museums and comparable collections, so it is always possible to compare the described species with the original material. But what if this type material gets destroyed? During the last centuries, wars, fires and other catastrophes as well as inappropriate or lacking maintenance have already destroyed a lot of type material, creating a difficult situation for taxonomists.

During World War II, in the night of 28./29. Mar. 1942, the city of Lübeck was the first German city that was considerably destroyed by allied air forces. The museum in the centre of the city, that contained the natural history collection, was completely destroyed and the collection material was burnt. This also concerned the spider collection with all type material (Fütting pers. comm.). The natural history museum of Stuttgart, initially the “Kurfürstliches Naturalien-Cabinet”, was hit when the city was bombed in September 1944. The building burnt out completely and the collections were destroyed (Roewer 1955, 1959, 1960, Renner 1988, Renner pers. comm.). In the city of Tübingen 800 buildings were damaged or destroyed by air bombing. The spider collection in a small museum at the University was (probably together with other collection material) stored in wooden boxes that survived the end of the war. After the war, during cleaning-up the buildings in 1945, the boxes were “dumped to gain free space”, i.e. they were destroyed (Weber pers. comm.). Parts of the ethanol collection of the Wiesbaden Museum were stored during the war in a gardener’s house in the spa gardens due to their flammability. During an air attack in the night of 2./3. Feb. 1945, this material was entirely destroyed. The museum building including other collections was, however, left without damage (Heineck 1950). On the other hand, two very large natural history museums in Germany survived World War II with less damage: the Senckenberg Museum in Frankfurt/Main and the Natural History Museum in Berlin had enough time to evacuate their collections into safe areas, so that they survived.

From 1906 to 1917, Embrik Strand described 381 spider species and one subspecies from collection material stored in the museums of Lübeck, Stuttgart, Tübingen and Wiesbaden. By analysing his publications (Strand 1906a, 1906b, 1906c, 1907a, 1907b, 1907c, 1907d, 1907e, 1907f, 1908a, 1908b, 1908c, 1915a, 1915b, 1917), we learnt which species he described and where the type material was deposited because in these publications he always stated to which museum the material belonged. This is in remarkable contrast to his usual habit of not indicating where he deposited the type material (Nentwig et al. 2019). In this publication, we deal with the species described by Strand and type material deposited in museums that were later destroyed. Strand also described a series of subspecies, varieties and forms, we investigated earlier (see Nentwig et al. 2019).

From these 382 taxa, a subset of 64 species has meanwhile been declared as nomina dubia and 57 species were synonymized with other species. For 79 species, Strand provided illustrations, so that the spiders could (at least theoretically) be recognized, other authors illustrated them, and/or type or non-type material was found in other museums (all information from the World Spider Catalog 2019).
For the remaining 182 spider taxa, we state here that:

- Strand deposited the type material in the museums of Lübeck (58 species), Stuttgart (103 species), Tübingen (11 species) and Wiesbaden (9 species and 1 subspecies) and all type material became verifiably destroyed (references in Tab. 1).

- There is no other type or non-type material known.

- Since their description by Strand, during a period of more than 110 years, none of these species has ever been recollected.

- None of these species has been mentioned in other publications, thus there is no further scientific literature about them. This statement does not include taxonomic revisions (such as Dalmas 1921: 292 or Laurent 1946: 311) or catalogue works (such as Bonnet 1955-1959, 1961 and Roewer 1955, 1959, 1960) that only listed the names or repeated Strand's descriptions without further investigations.

- Strand described these species in his characteristic manner, this means, he sometimes delivered long descriptions but useful diagnostic aspects and comparative discussions regarding other (similar) species were often missing (see Nentwig et al. 2019). Illustrations were not provided for any of them. Considering the magnitude of the world’s biodiversity known nowadays, it is impossible to recognize these species.

  - In 19 cases, Strand's description was based on juvenile specimens, in 153 cases, he had only one sex (41 males, 111 females), and in only 11 cases he had both sexes.

  We conclude that without type material or scientific illustrations and useful descriptions, it is impossible to recognize these species and subspecies. Therefore, we declare them here as nomina dubia. This concerns the 181 species listed in Tab. 1.

Tab. 1: List of species described by Strand 1906–1917 that are here declared as nomina dubia. The detailed argumentation is given in the text. M refers to the museums where the type material has been destroyed (L = Lübeck, S = Stuttgart, T = Tübingen, W = Wiesbaden), sex refers to the type material described (m = male, f = female, j = juvenile), the comment row lists references and further comments: (1) Füting (pers. comm.), (2) Renner (pers. comm.), (3) Weber (pers. comm.), (4) Roewer (1959), (5) Roewer (1960), (6) Renner (1988), (7) Jäger (1998), (8) monotypic genus, (9) ditypic genus.

| family/species described as | valid name | reference | M | sex | comment |
|-----------------------------|------------|-----------|----|-----|---------|
| Araneidae                   |            |           |    |     |         |
| Aranea aballennis           | Araneus aballensis (Strand, 1906) nomen dubium | Strand 1906a | S | f | (2) (6) |
| Aranea akakensis            | Araneus akakensis (Strand, 1906) nomen dubium | Strand 1906a | S | m | (2) (6) |
| Aranea bagamoyensis         | Araneus bagamoyensis (Strand, 1906) nomen dubium | Strand 1906a | S | f | (2) (6) |
| Aranea blochmanni           | Araneus blochmanni (Strand, 1907) nomen dubium | Strand 1907e | T | f | (3) |
| Aranea braueri              | Araneus braueri (Strand, 1906) nomen dubium | Strand 1906a | S | m | (2) (6) |
| Aranea caplandensis         | Araneus caplandensis (Strand, 1907) nomen dubium | Strand 1907a | L | m | (1) |
| Aranea haplocapitella       | Araneus haplocapitellus (Strand, 1907) nomen dubium | Strand 1907a | L | f | (1) |
| Aranea ladischioha          | Araneus ladischioha (Strand, 1906) nomen dubium | Strand 1906a | S | f | (2) (6) |
| Aranea lamperti             | Araneus lamperti (Strand, 1907) nomen dubium | Strand 1907a | L | f | (1) |
| Aranea mea                  | Araneus mea (Strand, 1907) nomen dubium | Strand 1907a | L | f | (1) |
| Aranea niggmani             | Araneus niggmani (Strand, 1906) nomen dubium | Strand 1906b | S | f | (2) (6) |
| Aranea nossiboea            | Araneus nossiboea (Strand, 1907) nomen dubium | Strand 1907c | L | j | (1) |
| Aranea pabli                | Araneus pabli (Strand, 1906) nomen dubium | Strand 1906b | S | f | (2) (6) |
| Aranea rauj                 | Araneus rauj (Strand, 1907) nomen dubium | Strand 1907f | W | j | (7) |
| Aranea saccalavos           | Araneus saccalavos (Strand, 1907) nomen dubium | Strand 1907c | L | f | (1) |
| Aranea zela                 | Araneus zela (Strand, 1907) nomen dubium | Strand 1907a | L | f | (1) |
| Aranea zulana               | Araneus zulanaus (Strand, 1907) nomen dubium | Strand 1907a | L | f | (1) |
| Cyclosa bova                | Cyclosa bova Strand, 1907 nomen dubium | Strand 1907c | L | m | (1) |
| Nemoscolus caudifer         | Nemoscolus caudifer Strand, 1906 nomen dubium | Strand 1906b | S | f | (2) (6) |
| Prasonica affinis           | Prasonica affinis Strand, 1906 nomen dubium | Strand 1906a | S | j | (2) (6) |
| Prasonica olivacea          | Prasonica olivacea Strand, 1906 nomen dubium | Strand 1906a | S | j | (2) (6) |
| Barychelidae                |            |           |    |     |         |
| Nossibea processigera       | Tigridia processigera (Strand, 1907) nomen dubium | Strand 1907a | L | j | (1) |
| Caponiidae                  |            |           |    |     |         |
| Caponia abyssinica          | Caponia abyssinica Strand, 1908 nomen dubium | Strand 1908b | S | f | (2) (6) |
| Clubionidae                 |            |           |    |     |         |
| Carteronella macroclava     | Carteronella macroclava Strand, 1907 nomen dubium | Strand 1907a | L | m | (1) (8) |
| Clubiona caplandensis       | Clubiona caplandensis Strand, 1907 nomen dubium | Strand 1907a | L | f | (1) |
| Clubiona limpidella         | Clubiona limpidella Strand, 1907 nomen dubium | Strand 1907a | L | f | (1) |
| Corinnaidae                 |            |           |    |     |         |
| Corpua auroplumosa          | Corpua auroplumosa Strand, 1907 nomen dubium | Strand 1907c | L | f | (1) |
| Corinna longitarsis         | Corinna longitarsis Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| family/species described as | valid name | reference | M | sex | comment |
|-----------------------------|------------|-----------|---|-----|---------|
| Corinna mandibulata         | Corinna mandibulata Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
| Corinna olivacea            | Corinna olivacea Strand, 1906 nomen dubium | Strand 1906a | S | j   | (2) (6) |
| Corinna sanguinea           | Corinna sanguinea Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
| Ctenidae                    | Ctenus 5-vittatus | Strand 1907a | L | j   | (1) |
|                             | Ctenus beerwaldi | Strand 1906b | S | j   | (2) (6) |
|                             | Ctenus biprocessis | Strand 1906a | S | m,f | (2) (6) |
|                             | Ctenus clariventris | Strand 1906a | S | f   | (2) (6) |
|                             | Ctenus schneideri | Strand 1906b | S | j   | (2) (6) |
| Cyrtauchenidiidae           | Ancylotrypa bicornuta Strand, 1906 nomen dubium | Strand 1906c | W | m   | (7) |
| Desidae                     | Amaurobius blochmanni (Strand, 1907) nomen dubium | Strand 1907e | T | j   | (3) |
|                             | Aphyctoschaema javana (Strand, 1907) nomen dubium | Strand 1907c | T | f   | (3) |
| Eresidae                    | Dresserus nasiculosa Strand, 1907 nomen dubium | Strand 1907a | S | f   | (2) (6) |
| Gnaphosidae                 | Drassodes adiensis Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Drassodes prosthesimiformis Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Drassodes subviduatus Strand, 1906 nomen dubium | Strand 1906a | S | m,f | (2) (6) |
|                             | Drassodes vorax Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Poecilocroa malagassa Strand, 1907 nomen dubium | Strand 1907c | L | m   | (1) |
|                             | Prozidomus lampei Strand, 1915 nomen dubium | Strand 1915a | W | f   | (7) |
|                             | Prothrypta quadridentata Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Pythoimania orbiculata Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Scotophaeus bersehaensis Strand, 1915 nomen dubium | Strand 1915b | W | f   | (7) |
|                             | Scotophaeus nosibeiensis Strand, 1907 nomen dubium | Strand 1907c | L | f   | (1) |
|                             | Scotophaeus parvicolus Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
|                             | Tbeuma intermedia Strand, 1915 nomen dubium | Strand 1915b | W | m   | (7) |
|                             | Theumella penicillata Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) (9) |
|                             | Theumella typica Strand, 1906 nomen dubium | Strand 1906a | S | m   | (2) (6) (9) |
| Halonoproctidae             | Latouchia fasciata Strand, 1907 nomen dubium | Strand 1907d | S | f   | (2) (6) |
| Idiopidae                   | Ctenolophus beligomericiformis Strand, 1907 nomen dubium | Strand 1907a | S | f   | (2) (6) |
|                             | Idiopis bersehaensis Strand, 1917 nomen dubium | Strand 1917 | W | f   | (7) |
| Linyphiidae                 | Tnetictes araneiformis Strand, 1907 nomen dubium | Strand 1907c | L | f   | (1) (8) |
| Lycosidae                   | Lycosa brevimetatarsis (Strand, 1907) nomen dubium | Strand 1907e | T | f   | (3) |
|                             | Lycosa palliclava (Strand, 1907) nomen dubium | Strand 1907b | S | m   | (2) (6) |
|                             | Lycosa zorimorpha (Strand, 1907) nomen dubium | Strand 1907c | L | m,f | (1) (4) |
|                             | Tarentula picturella Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (5) (6) |
|                             | Tarentula schweinfurthi Strand, 1906 nomen dubium | Strand 1906b | S | f   | (2) (6) |
|                             | Tarentula urbana molensis Strand, 1908 nomen dubium | Strand 1906a | S | m   | (2) (5) (6) |
|                             | Tarentula urbanides Strand, 1907 nomen dubium | Strand 1907c | L | f   | (1) (5) |
|                             | Trochosa rubicundicolorata Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (5) (6) |
| Miturgidae                  | Syriska drassiformis Strand, 1906 nomen dubium | Strand 1906a | S | f   | (2) (6) |
| Nemesiidae                  | Hermacha nigromarginata Strand, 1907 nomen dubium | Strand 1907a | L | m   | (1) |
|                             | Pseudohermacha annulipes Strand, 1907 nomen dubium | Strand 1907a | L | j   | (1) |
| family/species described as | valid name | reference | M | sex | comment |
|----------------------------|------------|-----------|---|-----|---------|
| **Oxyopidae**              |            |           |   |     |         |
| Oxyopes abeaeae            | Oxyopes abeaeae Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes africanus          | Oxyopes africanus Strand, 1906 nomen dubium | Strand 1906a | S | m | (2) (6) |
| Oxyopes akakensis           | Oxyopes akakensis Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes erlangeri          | Oxyopes erlangeri Strand, 1906 nomen dubium | Strand 1906a | S | m | (2) (6) |
| Oxyopes exsiccatus         | Oxyopes exsiccatus Strand, 1907 nomen dubium | Strand 1907b | S | f | (2) (6) |
| Oxyopes hostides           | Oxyopes hostides Strand, 1906 nomen dubium | Strand 1906a | S | m | (2) (6) |
| Oxyopes inopinicus         | Oxyopes inopinicus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes infidelis          | Oxyopes infidelis Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes juvenescus         | Oxyopes juvenescus Strand, 1907 nomen dubium | Strand 1907b | S | j | (2) (6) |
| Oxyopes lenzi              | Oxyopes lenzi Strand, 1907 nomen dubium | Strand 1907a | L | m, f | (1) |
| Oxyopes lineatiformur      | Oxyopes lineatiformur Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes luteo-aculaetus     | Oxyopes luteo-aculaetus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes noticvittatus      | Oxyopes noticvittatus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes oranicola          | Oxyopes oranicola Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Oxyopes sternimaculatus    | Oxyopes sternimaculatus Strand, 1907 nomen dubium | Strand 1907a | L | m, f | (1) |
| Oxyopes subjavanus         | Oxyopes subjavanus Strand, 1907 nomen dubium | Strand 1907e | T | f | (3) |
| **Palpimanidae**           |            |           |   |     |         |
| Palpimanus sanguineus      | Palpimanus sanguineus Strand, 1907 nomen dubium | Strand 1907a | L | f | (1) |
| **Philodromidae**          |            |           |   |     |         |
| Philodromus caffer         | Philodromus caffer Strand, 1907 nomen dubium | Strand 1907a | L | f | (1) |
| Philodromus problematicus  | Philodromus problematicus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Thanatus multipunctatus    | Thanatus multipunctatus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Thanatus paucipunctatus    | Thanatus paucipunctatus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Tibellus vosseleri         | Tibellus vosseleri Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| **Pholcidae**              |            |           |   |     |         |
| Smeringopus affinitatus    | Smeringopus affinitatus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| **Pisauridae**             |            |           |   |     |         |
| Dolomedes lomensis         | Dolomedes lomensis Strand, 1906 nomen dubium | Strand 1906b | S | j | (2) (6) |
| Dolomedes submarginali-vittatus | Dolomedes submarginali-vittatus Strand, 1907 nomen dubium | Strand 1907e | T | f | (3) |
| **Hygroopoda madagascarica** | Hygroopoda madagascarica Strand, 1907 nomen dubium | Strand 1907e | L | f | (1) |
| **Salticidae**             |            |           |   |     |         |
| Carrhotus aeneochelis      | Carrhotus aeneochelis Strand, 1907 nomen dubium | Strand 1907e | T | m, f | (3) |
| Cyrba bidentata            | Cyrba bidentata Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Giuria unica               | Giuria unica Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Hyllus aethiopicus         | Hyllus aethiopicus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Hyllus erlangeri           | Hyllus erlangeri Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Hyllus fur                 | Hyllus fur Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Hyllus fusciventris        | Hyllus fusciventris Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Hyllus lugubrella          | Hyllus lugubrella Strand, 1908 nomen dubium | Strand 1908a | L | m | (1) |
| Hyllus manensis            | Hyllus manensis Strand, 1906 nomen dubium | Strand 1906a | S | m | (2) (6) |
| Hyllus nosibennis          | Hyllus nosibennis Strand, 1907 nomen dubium | Strand 1907c | L | f | (1) |
| Hyllus paebypessae         | Hyllus paebypessae Strand, 1907 nomen dubium | Strand 1907a | L | j | (1) |
| Hyllus thyenformis         | Hyllus thyenformis Strand, 1906 nomen dubium | Strand 1906a | S | m | (2) (6) |
| Hyllus virgillus           | Hyllus virgillus Strand, 1907 nomen dubium | Strand 1907c | L | j | (1) |
| Icius pseudocellatus       | Icius pseudocellatus Strand, 1907 nomen dubium | Strand 1907a | L | f | (1) |
| Myrmarchne patellata       | Myrmarchne patellata Strand, 1907 nomen dubium | Strand 1907b | S | m | (2) (6) |
| Pellenes aethiopicus       | Pellenes aethiopicus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Pellenes mimicus           | Pellenes mimicus Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| Philaeus steudeli          | Philaeus steudeli Strand, 1906 nomen dubium | Strand 1906b | S | m | (2) (6) |
| Phegra desquamata          | Phegra desquamata Strand, 1906 nomen dubium | Strand 1906a | S | f | (2) (6) |
| family/species described as | valid name | reference | M | sex | comment |
|----------------------------|------------|-----------|---|-----|---------|
| Rhene spuridens            | Rhene spuridens | Strand 1907e | T | f  | (3)     |
| Thianella disjuncta        | Thianella disjuncta | Strand 1907e | T | m  | (3) (8) |
| Thyene scalarinotum        | Thyene scalarinotum | Strand 1907a | L | f  | (1)     |
| Scytodidae                 |            |           |   |     |         |
| Scytodes bergeri           | Scytodes bergeri | Strand 1915b | W | m, f | (7)     |
| Scytodes subhoracica       | Scytodes subhoracica | Strand 1906b | S | f  | (2) (6) |
| Scytodes suffusa           | Scytodes suffusa | Strand 1906b | S | f  | (2) (6) |
| Segestridae                |            |           |   |     |         |
| Ariadna viridis            | Ariadna viridis | Strand 1906b | S | f  | (2) (6) |
| Sicariidae                 |            |           |   |     |         |
| Loxosceles pallidecolorata | Loxosceles pallidecolorata | Strand 1906a | S | f  | (2) (6) |
| Sparassidae                |            |           |   |     |         |
| Heteropoda graaflandi      | Heteropoda graaflandi | Strand 1907f | W | m  | (7)     |
| Heteropoda rufignatha      | Heteropoda rufignatha | Strand 1907b | S | m  | (2) (6) |
| Heteropoda veiliana        | Heteropoda veiliana | Strand 1907b | S | m  | (2) (6) |
| Heteropoda warthiana       | Heteropoda warthiana | Strand 1907b | S | j  | (2) (6) |
| Nonianus unilateralis      | Nonianus unilateralis | Strand 1908 | W | m  | (7)     |
| Olios soratensis           | Olios soratensis | Strand 1907a | L | m  | (1)     |
| Palystes spiralis          | Palystes spiralis | Strand 1907c | L | m  | (1)     |
| Pediana aurochelis         | Pediana aurochelis | Strand 1907e | T | j  | (3)     |
| Torania manni              | Torania manni | Strand 1906b | S | f  | (2) (6) |
| Tetragnathidae             |            |           |   |     |         |
| Leucauge abbajae           | Leucauge abbajae | Strand 1907a | S | f  | (2) (6) |
| Leucauge auronotum         | Leucauge auronotum | Strand 1907a | L | f  | (1)     |
| Leucauge profundifoveata   | Leucauge profundifoveata | Strand 1906a | S | f  | (2) (6) |
| Leucauge tetragnathella    | Leucauge tetragnathella | Strand 1907c | L | f  | (1)     |
| Orsinome vorkampiana       | Orsinome vorkampiana | Strand 1907c | L | m, f | (1)     |
| Pachynathua africana       | Pachynathua africana | Strand 1906a | S | m, f | (2) (6) |
| Parameta defecta           | Parameta defecta | Strand 1906a | S | f  | (2) (6) |
| Tetragnatha lamperti       | Tetragnatha lamperti | Strand 1906a | S | m, f | (2) (6) |
| Theraphosidae              |            |           |   |     |         |
| Brachionopus leptopelmiformis | Brachionopus leptopelmiformis | Strand 1907a | L | m  | (1)     |
| Cryptopholus sargi         | Cryptopholus sargi | Strand 1907d | S | f  | (2) (6) |
| Eurypelmella masculina     | Eurypelmella masculina | Strand 1907d | S | m  | (2) (6) (8) |
| Haplopelma robustus        | Haplopelma robustus | Strand 1907d | S | f  | (2) (6) |
| Harpactira guttata         | Harpactira guttata | Strand 1907a | L | f  | (1)     |
| Heterathe villosella       | Heterathe villosella | Strand 1907a | L | m  | (1)     |
| Hysterocrates affinis       | Hysterocrates affinis | Strand 1907a | L | f  | (1)     |
| Hysterocrates Haasi        | Hysterocrates haasi | Strand 1906b | S | f  | (2) (6) |
| Hysterocrates minimus      | Hysterocrates minimus | Strand 1907a | L | f  | (1)     |
| Hysterocrates spellenbergi | Hysterocrates spellenbergi | Strand 1906b | S | f  | (2) (6) |
| Hysterocrates vosseri      | Hysterocrates vosseri | Strand 1906b | S | f  | (2) (6) |
| Loxoptygella erlangeri    | Loxoptygella erlangeri | Strand 1906a | S | f  | (2) (6) |
| Melopoeus salangensis      | Melopoeus salangensis | Strand 1907d | S | f  | (2) (6) |
| Monocentropella stridulantissima | Monocentropella stridulantissima | Strand 1907e | T | m  | (3)     |
| Phormictopus brasiliensis  | Phormictopus brasiliensis | Strand 1907d | S | f  | (2) (6) |
| Pseudhapalopus aculeatus   | Pseudhapalopus aculeatus | Strand 1907a | L | m  | (1)     |
| Selenocosmia subvulpina    | Selenocosmia subvulpina | Strand 1907d | S | m  | (2) (6) |
| Selencygurus brunneus      | Selencygurus brunneus | Strand 1907a | L | f  | (1)     |
| Sorata monticola           | Sorata monticola | Strand 1907a | L | f  | (1)     |
Palystes modificus minor was described by Strand (1906c: 41) as "var. minor". This must have been overlooked by other taxonomists because none of the arachnological catalogues had ever listed this taxon. The male type was deposited in the museum Wiesbaden and was destroyed (Jäger 1998). Following the logic of this publication, we should also declare it a nomen dubium. From the description it becomes clear that Strand actually considered it conspecific with another species he described (Palystes modificus): „Ein zweites Exemplar, das wohl derselben Art angehört…“ [A second specimen that belongs to the same species…]. Moreover, he admitted that the difference in body size he recognized between the specimens would not allow this. For example, Benoit (1968: 141) mentioned that "the identity of this species remains unsolved". All three researchers who came in the past to the same conclusion with respect to Strand’s species. Concerning Eurypelmella masculina, Gabriel (2016: 86) opposed a transfer to Schizopelma, as proposed by Raven (1985: 153), because Strand’s insufficient description would not allow this. For Mallinus defectus, Haddad et al. (2019: 157) wrote “The description of the species by Strand … does not provide a single clue as to the real identity” and Jäger (2014: 184) concluded for Torania/Barylestis manni that "this identity of this species remains unsolved". All three examples concern species listed in Table 1.

Generally, other arachnologists used the fact that the type material was lost or destroyed as a very strong argument to declare a species as a nomen dubium, often in combination with the weak descriptions of Strand and the unavailability of further specimens. For example, Benoit (1968: 141) mentioned that Selenops modestellus Strand, 1907 was "détruit durant la guerre … et décrit de façon insuffisante" [destroyed during the war … and described in an insufficient manner]; Blandin (1975: 384) wrote for Perenethis brevipes Strand, 1906 that "la description originale ne permet pas de se faire une idée correcte de cette espèce" [the original description does not allow to identify this species correctly]; Russell-Smith (1982: 91) similarly concluded for Trabaeops bidentigera Strand, 1906 that the type "was destroyed … and Strand’s description is insufficient to identify the species". "The female syntypes are lost and the type locality (Central Australia) is unknown" wrote Rix et al. (2017: 585) for Can-
tuarides exicatius Strand, 1907 and concluded on nomen dubium. FitzPatrick (2007: 98) came to a similar conclusion for nine Zelotes species described by Strand because “type material [was] lost or destroyed and the taxa are not recognisable from the original descriptions”, and Fukushima & Bertani (2017: 129) simply argued “type considered lost” and declared three species and one subspecies of Avicularia as nomina dubia. When Raven (1985: 113) synonymized the genus Nosiboea with Tigidia, he only argued “The type of Nosiboea is lost and was left unplaced by Benoit (1965). Strand (1907a) gave no characters by which Nosiboea differs from Tigidia.”

We can conclude that arachnologists frequently argued in comparable situations in favour of a nomen dubium statement and, meanwhile, such a statement is a kind of routine, also accepted by the World Spider Catalog (2019). It is necessary to underline that such a declaration needs strong guidelines. Unfortunately, the International Code of Zoological Nomenclature (ICZN 2012) does not provide such rules. The term “nomen dubium” does not even occur in the Code, it is only mentioned in its glossary where a nomen dubium is explained as “a name of unknown or doubtful application”. It should also be kept in mind that a nomen dubium declaration is a reversible process, just as the synonymization of two species that can be reversed, for example, within a comprehensive genus revision. The reality, however, shows that this is an extremely rare event, indicating, that the parameters used so far hold. We presented here a set of strong arguments (type material lost, insufficient description, no illustration, never re-collected) and recommend to be as critical as we were here. We are convinced that there are more doubtful species listed in the World Spider Catalog (2019) and such “cleaning-up” may help to release us from taxonomic ballast.

Recommendation
This unsatisfactory resolution of many taxa described by Embrík Strand provides a few lessons that are still valuable today and allow us to express three recommendations.

(1) Type material has to be described as completely and carefully as possible. Fortunately, standards today are much higher than at Strand’s time. He delivered sometimes long descriptions but often descriptions of the differences to higher taxa are even more prone to loss or ruin.

(2) Even today, a museum can burn down, as two recent incidents from Brazil showed us. To prevent similar total loss-es in future, we recommend that authors provide sound descriptions of both sexes based on all the available specimens, and, whenever possible, to deposit the type material in more than one institution (ideally in four to five), and never in private collections, as these unfortunately are often not curated after the collector’s death and therefore are even more prone to loss or ruin.

(3) At least for their type material, museums should provide electronic lists and maintain databases of their possessions (see also ICZN 2012: recommendation 72F). This allows us to know what they lost and to declare neotypes, if this is required (ICZN 2012: article 75).

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