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## Diversity and endemism in the scorpion fauna of Vietnam. A preliminary synopsis



*Diversité et endémisme dans la faune de scorpions du Vietnam.  
Un synopsis préliminaire*

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## ABSTRACT

A faunistic inventory is proposed for the known Vietnamese scorpion species. The aim of this contribution is to bring an up-to-date checklist of all known species in Vietnam, prior to a more detailed study of the Vietnamese fauna to be performed by one of the authors (T.-H.T.) in the context of the preparation of a doctoral degree. Final taxonomic decisions should be taken at the end of the doctoral dissertation.

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## R É S U M É

Un inventaire faunistique est proposé pour la totalité des espèces de scorpions connues du Vietnam. L'objectif de la présente contribution est de proposer une *checklist* actualisée de toutes les espèces répertoriées pour le Vietnam, préalablement à une étude beaucoup plus complète que réalise l'un des auteurs (T.-H.T.) dans le cadre de la préparation d'une thèse de doctorat. Des décisions taxonomiques définitives devront être prises en conclusion de la dissertation doctorale.

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## 1. Introduction

Faunistic inventories of several zoological groups, and in particular of scorpions, are not a recent task. A number of publications were proposed since the beginning of the 20th century, e.g., Pocock [1,2] respectively for India and Central America, Fage [3] for Madagascar, Hoffmann [4,5] for Mexico, Mello-Leitão [6] for South America, Vachon [7] for

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North Africa, Lamoral [8] for Namibia, Levy and Amitai [9] for Palestine, Tikader and Bastawade [10] for India, González-Sponga [11] for Venezuela, Lourenço [12] for Madagascar, Lourenço [13] for Brazil and Ojanguren Affilastro [14] for Argentina. The impact of such studies is variable, according to the approach used. In a number of cases, only basic compilations are proposed, whereas in others precise diagnosis and patterns of distributions of each species are presented.

Whatever be their final result, the preliminary aim of these faunistic studies is, in all cases, to bring a clear view of the existent fauna in a given country or a given region. The scope of this note is to synthesize what is presently known about the scorpion fauna of Vietnam.

## 2. Historical aspects of scorpion studies in Vietnam and nearby countries

When referring to present Vietnam, one has to have in mind previous research studies performed in what was Indochina in the course of time. In fact, a large portion of Southeast Asia, namely the present countries of Vietnam, Laos (Lào), Cambodia (Cam Pu Chia), and also part of South China (Trung Quoc) had been under French control for about a hundred years (Fig. 1). Consequently, the preliminary zoological studies done in these regions were conducted by French scientists (as for other French colonies, e.g., [3,7]). Curiously, Indochinese scorpions did not call the attention of early scientists, most certainly because the species present in this region of the world do not present noxious venoms to humans. On the contrary, snake envenoming proved to be an early subject of interest in Vietnam. Since the end of the 19th century, an important research work was performed by A. Calmette, who was sent in Vietnam by Louis Pasteur to create the first overseas 'Institut Pasteur' in Saigon City (now Ho Chi Minh City). Thanks to the research of Calmette on the Cobra venom, the first antivenom therapy was developed in Vietnam and subsequently improved in France [15].

Studies on Indochinese scorpions started only in the second third of the 20th century, and this fauna still remains poorly known. Pioneering work was conducted by Fage [16–18], who described interesting new elements of this fauna [16,19].

The specimens studied by Fage [16–18] have been collected during the expeditions of the French zoologist of Russian origin, Prof. Constantine Dawydoff, who in 1929–1934 and 1938–1939 conducted fundamental zoological research in Indochina in the Institute of Oceanography located at Cau Da (now belonging to Nha Trang City, Khanh Hoa Province, Vietnam). The scorpion species *Hormiops davidovi* Fage, 1933 from Poulo Condore was, by the way, named in homage to C. Dawydoff [17,19].

Constantine Dawydoff (1877–1960) was an active field biologist. He studied zoology in St. Petersburg University from 1896, and worked under A. O. Kovalevsky. He got his doctoral degree (on nemertines) in 1915; in 1922 he fled from Soviet Russia to France, worked in the laboratories of M. Caullery (Paris) and O. Dubosque (Banyuls-sur-Mer). Dawydoff worked twice for a long time in Indochina (1929–1934 and 1938–1939). He described from

Indochina over 140 species of sponges, over 500 species of coelenterates, almost 100 species of Bryozoa [20,21].

Even if most of the zoological efforts done by C. Dawydoff in Indochina were devoted to marine biology, he also intensively collected terrestrial groups, including Arachnida. The results published by Fage [16–18] were related to this, but also to other topics such as Pseudoscorpiones [22].

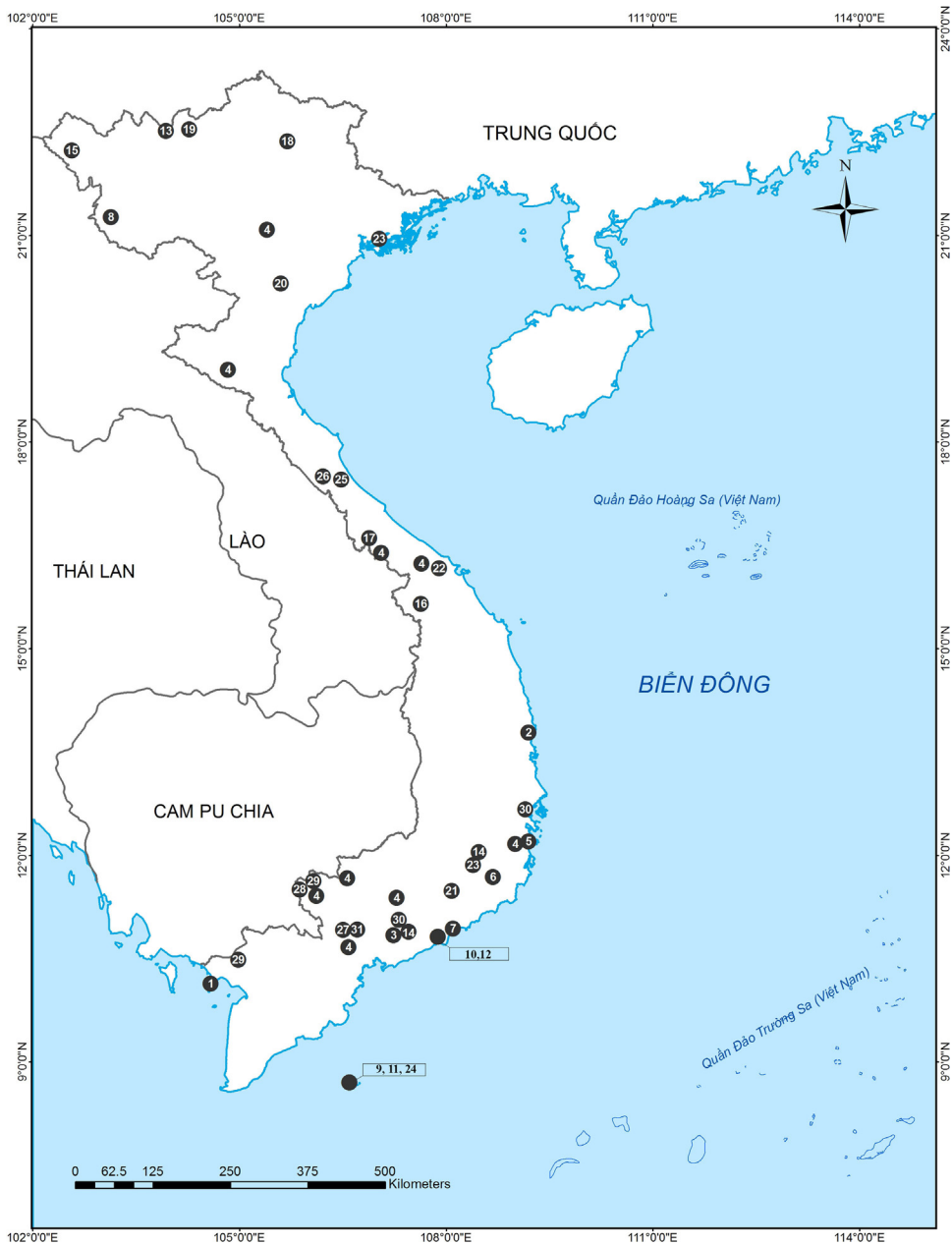
Subsequently, a number of contributions revealed additional new species, such as the monographic work of Couzijn [23] on the genus *Heterometrus* Ehrenberg, 1828, followed by the revision of this same genus by Kovařík [24] and the isolated description of a new *Heterometrus* by Zhu and Yang [25]. Other publications followed such as the revisions of the family Scorpipiidae Kraepelin, 1905 and genera *Chaerilus* Simon, 1877 and *Isometrus* Ehrenberg, 1828 by Kovařík, [26–28]. Several others publications on the families Chaerilidae and Scorpipiidae were produced, on the one hand, by Kovařík [29–31] and Kovařík et al. [32,33], and, on the other hand, in the frame of an official collaboration between French and Vietnamese groups [34–43].

Unfortunately, Kovařík's and Kovařík's et al. [29–33] descriptions of several new species are rather insufficient, often poorly illustrated, and any attempt at revising these species is hampered by the fact that types are, in most cases, deposited in private collections, not accessible to scientists in general. Moreover, there is no doubt that most specimens described by these authors have not been legally collected in Vietnam. To collect specimens from Vietnam, authors have to get a sampling permit from the Vietnamese Administration of Forestry, and taking these specimens abroad needs to get an exporting permit from CITES authorities of Vietnam. The laws in this country are quite severe concerning illegal collecting of zoological specimens, and there are no records attesting to the deliverance of legal permits to the collectors cited in Kovařík's and Kovařík et al.'s [29–33] publications. Data about the sites of collection, the dates and name of collectors may be biased by the uncertain origins of the described material.

In a few cases, the study of specimens from the collections of the 'Muséum national d'histoire naturelle', Paris, allowed more precise diagnoses and proper illustrations of a few species such as *Chaerilus petrzekai* Kovařík, 2000 and *Isometrus (Reddyanus) petrzekai* Kovařík, 2003, both from Vietnam [37,38].

The official cooperation between French and Vietnamese groups, represented by the 'Muséum national d'histoire naturelle' in Paris and the Vietnam Academy of Science and Technology in Hanoi, led to some interesting discoveries, concerning both families Chaerilidae and Scorpipiidae [34–43].

Most remarkable, however, was the discovery and description of new elements of the enigmatic family Pseudochactidae Gromov, 1998 in both Laos and Vietnam. This family was originally known only from Tajikistan and Uzbekistan, countries located more than 5000 km away from Laos and Vietnam [44]. A new genus and species belonging to this family, *Troglokhammouanus steineri* Lourenço, 2007, were discovered and described from caves



**Fig. 1.** Map of Vietnam showing the confirmed records of scorpions for the country: 1. *Isometrus deharvengi*. 2. *Isometrus maculatus*. 3. *Isometrus petrzekai*. 4. *Lychas mucronatus*. 5. *Chaerilus longimanus*. 6. *Chaerilus granulatus*. 7. *Chaerilus hofereki*. 8. *Chaerilus pathom*. 9. *Chaerilus terueli*. 10. *Chaerilus anneeae*. 11. *Chaerilus phami*. 12. *Chaerilus juliettae*. 13. *Chaerilus vietnamicus*. 14. *Chaerilus petrzekai*. 15. *Vietscorpions dentidactylus*. 16. *Alloscorpions troglodytes*. 17. *Euscorpions dakrong*. 18. *Euscorpions cavernicola*. 19. *Euscorpions thaomischorum*. 20. *Euscorpions kaftani*. 21. *Scorpions oligotrichus*. 22. *Euscorpions sejnai*. 23. *Liocheles australasiae*. 24. *Hormiops davidovi*. 25. *Vietbocap canhi*. 26. *Vietbocap thienduongensis*. 27. *Heterometrus cimmani*. 28. *Heterometrus liangi*. 29. *Heterometrus laoticus*. 30. *Heterometrus petersii*. 31. *Heterometrus spinifer*. Are not included in the map the species corresponding to misidentifications: *Isometrus vittatus*. *Chaerilus celebensis*. *Chaerilus truncatus*.

in Laos [45]. More recently, another new genus, *Vietbocap* Lourenço and Pham, 2010 and three new species were discovered and described from both Vietnam and Laos. A new subfamily Vietbocapinae Lourenço, 2012 was also proposed to accommodate this particular group of scorpions [46–48]. The genera and species of the family Pseudochactidae in Vietnam and Laos represent very

particular troglobitic elements from the Khamouan cave system, which is distributed between these two countries.

### 3. Methods

A checklist of the scorpion species previously reported from Vietnam is proposed, and the status of each species is

briefly commented. However, for several species, no final decision about their validity can be reached in account of the impossibility to study the original type material. New material collected in the original type localities should bring about some final clarification about their status.

#### 4. Results

##### Checklist of the scorpion species recorded from Vietnam (Fig. 1)

###### Present status of species:

\* Species introduced to Vietnam

\*\* Case of misidentification

\*\*\* Valid species

\*\*\*\* Species requiring a confirmation of its validity

\*\*\*\*\* New species to be described

\* In account of marked morphological differences with *Scorpiops*, *Vietscorpiops* is raised to generic rank.

**Family** Buthidae C. L. Koch, 1837

**Genus** *Isometrus* Ehrenberg, 1828

*Isometrus maculatus* (DeGeer, 1778)\*

*Isometrus vittatus* Pocock, 1900\*\*

*Isometrus petrzekai* Kovařík, 2003\*\*\*

Type locality and coordinates: Dong Nai province, Vinh Cuu district, Ma Da forest (10°56'N – 107°20'E).

*Isometrus deharvengi* Lourenço and Duhem, 2010\*\*\*\*

Type locality and coordinates: Kien Giang province, Kien Luong district, Hon Chong mountain (10°08'N – 104°35'E).

**Genus** *Lychas* C. L. Koch, 1845

*Lychas mucronatus* (Fabricius, 1798)\*\*\* (Fig. 2)

**Family** Chaerilidae Pocock, 1893

**Genus** *Chaerilus* Pocock, 1893

*Chaerilus celebensis* Pocock, 1894\*\*

*Chaerilus truncatus* Karsch, 1879\*\*

*Chaerilus petrzekai* Kovařík, 2000\*\*\*

Type locality and coordinates: Dong Nai province, Vinh Cuu district, Ma Da forest (10°56'N – 107°21'E); Lam Dong province, Lang-Biang mountain (12°02'N – 108°26'E).

*Chaerilus vietnamicus* Lourenço and Zhu, 2008\*\*\*



Fig. 2. *Lychas mucronatus* (Fabricius, 1798), male. Photo T. Ziegler.

Type locality and coordinates: Lao Cai province, Lao Cai city, Dong Tuyen commune (22°31'N – 103°56'E).

*Chaerilus juliettae* Lourenço, 2011\*\*\*\*

Type locality and coordinates: Binh Thuan province, Ta Kou mountain (10°49'N – 107°53'E).

*Chaerilus phami* Lourenço, 2011\*\*\*\*

Type locality and coordinates: Ba Ria-Vung Tau province, Con Son island (8°42'N – 106°36'E).

*Chaerilus anneae* Lourenço, 2012\*\*\*\*

Type locality and coordinates: Binh Thuan province, Ta Kou mountain (10°49'N – 107°53'E).

*Chaerilus terueli* Kovařík, 2012\*\*\*\*

Type locality and coordinates: Ba Ria-Vung Tau province, Con Son island (8°42'N – 106°36'E).

*Chaerilus hofereki* Kovařík, Král, Kořinkova, Reyes Lerma, 2014\*\*\*\*

Type locality and coordinates: Binh Thuan province, Phan Thiet city (10°56'N – 108°06'E).

*Chaerilus pathom* Lourenço and Pham, 2014\*\*\*\*

Type locality and coordinates: Dien Bien province, Dien Bien district, Pa Thom commune (21°16'N – 103°08'E).

*Chaerilus longimanus* Kovařík and Lowe, 2015\*\*\*\*

Type locality and coordinates: Khanh Hoa province, Nha Trang city (12°12'N – 109°12'E).

*Chaerilus granulatus* Kovařík, G. Lowe, D. Hoferek, M. Forman, J. Král, 2015\*\*\*\*

Type locality and coordinates: Ninh Thuan province, Ninh Son district (11°41'N – 108°41'E).

**Family** Hormuridae Laurie, 1896

**Genus** *Hormiops* Fage, 1933

*Hormiops davidovi* Fage, 1933\*\*\*\*

Type locality and coordinates: Ba Ria-Vung Tau province, Con Son Island (8°42'N – 106°36'E).

**Genus** *Liocheles* Sundevall, 1833

*Liocheles australasiae* (Fabricius, 1775)\*\*\*\*

*Liocheles* sp. (aff. *L. australasiae*)\*\*\*\*\* (Fig. 3)

**Family** Pseudochactidae Gromov, 1998

**Subfamily** Vietbocapinae Lourenço, 2012

**Genus** *Vietbocap* Lourenço and Pham, 2010

*Vietbocap canhi* Lourenço and Pham, 2010\*\*\*\*

Type locality and coordinates: Quang Binh province, Phong Nha-Ke Bang National Park, Tien Son cave (17°32'N – 106°16'E).



Fig. 3. *Liocheles* sp. (aff. *L. australasiae*), male. Photo T. Ziegler.





Fig. 4. *Vietbocap thienduongensis* Lourenço and Pham, 2012, male. Photo D.-S. Pham.

*Vietbocap thienduongensis* Lourenço and Pham, 2012<sup>\*\*\*</sup> (Fig. 4)

Type locality and coordinates: Quang Binh province, Phong Nha-Ke Bang National Park, Thien Duong cave (17°30'N – 106°13'E).

**Family** Scorpionidae Latreille, 1802

**Genus** *Heterometrus* Ehrenberg, 1828

*Heterometrus spinifer* (Ehrenberg, 1828)<sup>\*\*</sup>

*Heterometrus petersii* (Thorell, 1876)<sup>\*\*\*</sup>

*Heterometrus laoticus* Couzijn, 1981<sup>\*\*\*</sup> (Fig. 5)

*Heterometrus cimmani* Kovařík, 2004<sup>\*\*\*</sup>



Fig. 5. *Heterometrus laoticus* Couzijn, 1981, female. Photo E. Ythier.

*Heterometrus liangi* Zhu and Yang, 2007<sup>\*\*\*\*</sup>

Type locality and coordinates: Tay Ninh province, Tan Bien district (11°36'N – 105°54'E).

**Family** Scorpipidae Kraepelin, 1905

**Genus** *Alloscorplops* Vachon, 1980

*Alloscorplops troglodytes* Lourenço and Pham, 2015<sup>\*\*\*</sup>

Type locality and coordinates: Quang Nam province, Nam Giang district, Cha Vanh commune (15°39'N – 107°38'E).

**Genus** *Euscorplops* Vachon, 1980

*Euscorplops kaftani* (Kovařík, 1993)<sup>\*\*\*</sup>

Type locality and coordinates: Ninh Binh province, Cuc Phuong National Park (20°18'N – 105°36'E).

*Euscorplops sejnai* (Kovařík, 2000)<sup>\*\*\*</sup>

Type locality and coordinates: Thua Thien-Hue province, Bach Ma National Park (16°10'N – 107°54'E).

*Euscorplops thaomischorum* Kovařík, 2012<sup>\*\*\*\*</sup>

Type locality and coordinates: Lao Cai province, Bac Ha district, Thong Phep Bung village (22°32'18"N – 104°16'24"W).

*Euscorplops cavernicola* Lourenço and Pham, 2013<sup>\*\*\*</sup>

Type locality and coordinates: Bac Kan province, Ba Be district, Quang Khe commune (22°22'N – 105°42'E).

*Euscorplops dakrong* Lourenço and Pham, 2014<sup>\*\*\*</sup>

Type locality and coordinates: Quang Tri province, Dakrong nature reserve (16°30'N – 106°55'E).

**Genus** *Scorpiops* Peters, 1861

*Scorpiops oligotrichus* Fage, 1933<sup>\*\*\*</sup>

**Genus** *Vietscorplops* Lourenço and Pham, 2015<sup>+</sup>

*Vietscorplops dentidactylus* (Lourenço and Pham, 2015) comb. n.<sup>\*\*\*</sup>

Type locality and coordinates: Dien Bien province, Muong Nhe district, Nam Vi commune (22°14'N – 102°34'E).

#### Disclosure of interest

The authors declare that they have no competing interest.

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