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Bibliography

Bibliography of the giant honeybees, *Apis dorsata* Fabricius (1793) and *Apis laboriosa* F. Smith (1871)*

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Abstract – This bibliography of the published literature on *Apis dorsata* and *A. laboriosa* was compiled from 988 references written by 934 authors published in 290 periodicals, conference proceedings, theses, reports and books covering the period 1793–2005. The literature shows a balance between the applied aspects of beekeeping and basic honeybee biology for *A. dorsata*; but for *A. laboriosa* it reflects more basic biology.

***Apis dorsata* / *Apis laboriosa* / bibliography / beekeeping**

Commentary

Although *A. dorsata* is widely distributed throughout sub-Himalayan and oceanic Asia, it lacks economic parity with *A. mellifera* and *A. cerana* in these regions and has drawn less attention. *A. laboriosa* has a very restricted Himalayan distribution and is far less well known. Of an estimated 100 000 publications on *Apis*, only 963 concern A. *dorsata* (< 1%) while only 87 serve *A. laboriosa* (< 0.1%). This is also reflected in the listings of a computer search engine (Google.com) which, at the end of September 2006, included about 1 050 000 websites for *A. mellifera*, about 75 000 for *A. cerana,* 38 400 for *A. dorsata* and 21 100 for *A. laboriosa*. The literature on *A. dorsata* is likely to continue increasing because a century after the initial development of rafter beekeeping in Borneo, Cambodia and Vietnam (Crane, 1999) the technique is becoming a widespread adjunct to rural development, as evidenced by some 1510 recent computer websites just on this technique.

Accessing this literature is by no means an easy task and it cannot be gathered from computer websites. The published literature is also "classical" in that it is in print and most of it will have passed through some sort of peer-review process. Against this, a recent check on the computer website search engine "Google" revealed over 38 400 *A. dorsata* entries which, with rare exceptions, were not peer-reviewed. Moreover, extremely few of these sites derive from Asia, where *A. dorsata* and *A. laboriosa* occur naturally. It seems desirable to gather and preserve the classical literature before it is swamped in a plethora of websites for which quality evaluation is difficult.

The directions in research on *A. dorsata* to date demonstrate a more general approach than is the case with *A. laboriosa*. There is a fairly even distribution of material on beekeeping, foraging, bee botany, pollination, honey, and basic aspects of honeybee biology, including genetics, classification, biogeography, reproduction, and queens The literature on basic biology reflects the same trends seen in the western literature. The country sources of published research of *A. dorsata* form three tiers

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of relative productivity: India is the source of 38% of all publications, followed by Indonesia, Vietnam, Sri Lanka and Pakistan with about 2–3% each, but the remaining countries where *A. dorsata* naturally occurs have very little published research on this species. Because of its more restricted distribution, publications on *A. laboriosa* derive mainly from Nepal (45%), and China (14%), with very few from other countries.

Since the original descriptions of *A. dorsata* by Fabricius (1793) and *A. laboriosa* by Smith (1871), only 77 publications on these species appeared in the literature by the end of the World War II. It is noteworthy that in the last decade alone, a third of all *A. dorsata* and *A. laboriosa* publications have appeared. This bibliography was prepared by obtaining all references to Asian honeybees published in Apicultural Abstracts (1950–2005), Zoological Record (1864–2003) and dorsata-specific bibliographies such as those of Sharma (1951), Morse and Laigo (1968), Morse (1970), Crane (1967, 1978, 1987, 1991, 1993), Mishra (1987), Joshi (1995, 1996) and two anonymous sources (Anonymous 1989, 1992). The closest approximation to a bibliography on *A. laboriosa* is the list of references in the thesis by Underwood (1990). Nearly 90% of publications on *A. dorsata* and *A. laboriosa* are in western languages, primarily English, and all non-English titles have been translated for this bibliography. Copies of the originals were used to trace cited references in continuous iterations into the past until no new references were found. References were key-worded and entered in a computer database. PDF file of the bibliography is available from the authors. Readers seeking any of these publications could obtain many of them by down-loading the references from the Google Scholar website or, alternatively obtain them through the library service of the International Bee Research Association in Cardiff (http://www.ibra.org.uk/).

A wide approach to keywords was taken so that a particular pest, predator or disease can be searched under the broader category "disease/pest/predator". The following keywords are added to each reference as appropriate: absconding/migration/swarming, bee botany, beekeeping, behaviour, bibliography, biochemistry/organic chemistry, biogeography, brood, cerana, classification, combs, defense, disease/pests/predators, distribution, dorsata, drones, ecology, environmental effects, evolution, foraging, general biology, genetics, honey, laboriosa, morphology, pheromones, physiology, queens, reproduction, workers, Afghanistan, Arabia, Australia, Bangladesh, Bhutan, Borneo, Brunei, Cambodia, Ceylon, China, India, Indonesia, Iran, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sikkim, Singapore, Sri Lanka, Sumatra, Thailand, Vietnam.

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Bibliographie des abeilles géantes, *Apis dorsata* Fabricius (1793) et *Apis laboriosa* F. Smith (1871).

Zusammenfassung – Bibliographie über die Riesenhonigbienen, *Apis dorsata* Fabricius (1793) und *Apis laboriosa* F. Smith (1871).