

The Study of Butterflies

1. The Naming of Indian Butterflies

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Peter Smetacek works on the taxonomy and zoogeography of Indian Lepidoptera. He is also interested in exploring the potential of Lepidoptera as bio-indicators of ecological functions and groundwater.

The first part of this series is a brief history of the discovery and naming of Indian butterflies.

Butterflies are perhaps the best known insects and a great part of their attractiveness lies in the beautiful colours and patterns on their wings. Moreover, they are harmless and cannot bite, sting or otherwise cause pain. The origin of the name ‘butterfly’ is obscure: some think it refers to the buttery-yellow wings of male brimstone butterflies (*Gonepteryx rhamni* L.) that are among the earliest butterflies active in spring in Europe and the Himalaya. Other experts feel the word is a corruption of ‘flutter-bys’, referring to their flight. Whatever the origin, it is a pretty name that has stuck to these insects.

In India, butterflies were more or less overlooked in the period prior to the advent of Europeans. They are not figured in the rich carvings, wall paintings or other works of art that were created before the Mughal period. Nor are there references to butterflies in any of the Indian classics. One tale attributed to ‘Hindu mythology’ tells how Brahma, watching caterpillars gorge themselves, turn into pupae and finally emerge as butterflies in his vegetable garden was filled with great calm. Thereafter, he was sure of reaching his own perfection in the final incarnation. However, no one seems to know where or when this tale originated.

Among the earliest known depictions of butterflies in Indian art are several pietra dura panels behind the throne of Emperor Shah Jehan in the Diwan-i-Am (Hall of Public Audience) in Delhi’s Red Fort (*Figure 1*). There is a controversy about the nationality of the artist who executed these panels, since the central panel shows Orpheus charming the beasts with a violin.



This is a copy of a painting by the Italian artist Raphael (1483-1520 A.D.), who in turn copied it from the Roman catacombs. Therefore, it has been suggested that the artist was probably an European.

In Mughal art, although the birds and plants look very realistic rather than stylized, they are not often depictions of identifiable species (unless there have been a fearful number of extinctions). The same cannot be said of the butterflies depicted. The panel shown in *Figure 1* includes three butterflies, as well as a parrot-like bird on a fruiting branch. While two butterflies are shown with only two wings each and a worm-like body, the third has an absolutely featureless body although it has four wings. All three lack legs and antennae. Whatever the merits of the artist, he evidently had very little idea of the structure of butterflies. Nor did he appear to have any particular species in mind when he created these works of art. Indeed, there are no records of anyone having carefully examined a butterfly at the time.

Work on Indian butterflies began, in a rather haphazard manner, during the first half of the 18th century. During this period, the opening up of trade routes from Europe to many parts of the world, and the consequent increase in trade, had resulted in the collection of many life-forms curious and unfamiliar to Europeans. Some of these were of economic importance, while others served merely to whet the growing curiosity of Europeans. Yet others were the creations of imaginative sailors who in their free time sewed together different part of birds, mammals, reptiles and fishes. They sold these creations under fanciful names to credulous buyers who ranged from competent naturalists to society hostesses, whose only interest was filling their 'cabinet of curiosities' with more unusual creatures than possessed by their social rivals. For this reason, the first skin of the duck-billed platypus which was sent to Europe from Australia was dismissed

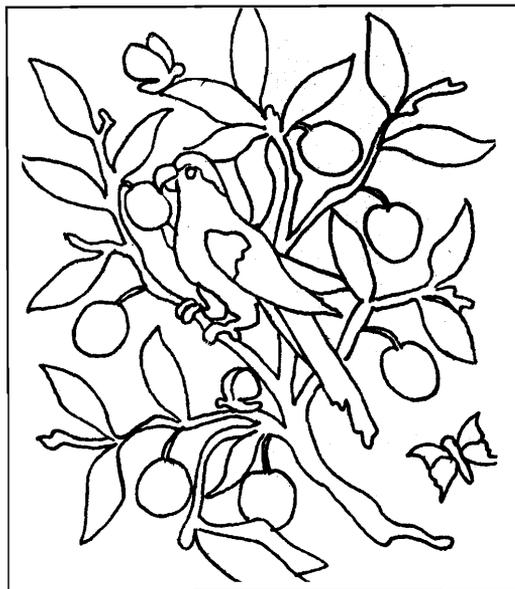


Figure 1. Outline of pietra dura panel behind the throne in the Diwan-i-Am in Delhi's Red Fort. Two butterflies are perched, one above the bird's head and one below its feet while one butterfly is flying beyond the tip of its tail.



Figure 2. The crimson rose *Pachliopta hector* was the first endemic Indian butterfly to be named. It was called *Papilio hector* by Linnaeus in 1758. It is found only in peninsular India, where it is sometimes a very common insect. (Specimen in Coll. Oxford University Museum)

as yet another practical joke, until no one could find the stitches that everyone presumed held the monstrosity together!

With a growing body of knowledge about different life-forms, it followed that the fakes were spotted and books about the genuine strange or beautiful creatures were published. One such work published an illustration and some notes about at least one endemic Indian butterfly. In 1758, the Swedish naturalist Carl von Linné (pronounced Karl fon Linné), or as he is better known – Carolus Linnaeus, who originated the binomial system of nomenclature, described this butterfly on the basis of the previous illustration. He called it *Papilio hector*. Today it is known as *Pachliopta hector* or the crimson rose (Figure 2). There are several butterfly species that occur in Europe and Asia, including India, that were described by Linnaeus, but these were described from European or even African specimens. *P. hector* is the only endemic Indian butterfly described by Linnaeus.

The process of cataloguing nature picked up momentum as the

Box 1. What's in a Name?

Often, people not familiar with Latin or Greek find the scientific names of creatures or plants forbidding. Today, there is a small but vociferous lobby for the introduction and use of what are known as common or trivial names, to make the study of nature more user-friendly. At the same time, professional biologists are aghast at the possibility of a return to the sort of chaos prevailing prior to the introduction of scientific names. At that time, nearly every plant and animal of use had a name, but different species were known by the same name in different areas, while the same species was often referred to by different names in neighbouring villages. Therefore, the need for universal names arose, under which all information concerning a particular species could be included. Trivial names inevitably come up against the barrier of language. For instance, should the butterfly *Synchlloe callidice* be known as the lofty bath white (India), peak white, checkered white or common white (North America) or the Alpenweissling (German)? The Poles and Slovaks probably call it something unpronounceable, while the French, Russians, Japanese and Chinese probably have their own names for it, too. Even if they do not, I doubt they will be willing to refer to it by any of the above trivial names. Nor is there any way of establishing precedence among trivial names, as is done in science. Who can argue if the Chinese claim that their name for a particular insect or plant is 4000 years old? We can start digging up Prakrit or Pali names, too. Therefore, reliance on common or trivial names is not such a good idea. It was found to be untenable over two centuries ago and nothing has happened since then to change that state of affairs.

Linnaean system gained universal acceptance. From 1775 onwards, J C Fabricius and Pieter Cramer described a number of Indian butterflies. The former described the Indian collections of Johan Gerhard Koenig (1728-1789), a Danish medical doctor who came to South India in 1767 and lived there until he died. He sent his collections of butterflies to the Zoological Museum in Copenhagen, where the specimens still exist. About 35 species of butterflies described by Fabricius are housed there and these are the oldest extant Indian butterflies.

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The 19th century saw vast progress in every field of science, and the study of butterflies was no exception. The East India Company's Museum at London contained a number of Indian butterflies, which were described by Thomas Horsfield and Frederick Moore between 1828 and 1859. Butterflies were collected even in the remotest parts of India by army men and civilians alike. More importantly, the art of preserving butterflies was also refined until it was possible to keep the two great enemies, mould and insects, away, thereby preserving specimens in good condition for extended periods of time. Whether from the torrid jungles of Assam, or the slopes of the high Himalaya, insect specimens were safely brought down to the seaports and transported to Europe or less often donated to the Calcutta Museum.

Large numbers of scientific papers and books describing Indian insects were also published during this period, some of them privately. Although of importance, this information was fragmentary in nature and scattered. The result was that the same butterfly species was often described several times under different names by different authors.

In 1883, George Marshall and Lionel de Nicéville published the first volume of a work titled *'The Butterflies of India, Burmah and Ceylon'*. In 1886 and 1890, de Nicéville published two more volumes in the series. These three volumes are the first systematic work on Indian butterflies and although three families, the swallowtails (Papilionidae), the whites (Pieridae) and the skip



Box 2. Families of Butterflies

Butterflies, which along with moths make up the order Lepidoptera, are divided into two superfamilies: the 'true' butterflies or Papilionoidea and the skippers or Hesperioidea. The Papilionoidea includes the following families.

Papilionidae (swallowtails): Most of the members of this family have the tips of their hindwings extended to form one or more tails and the abdomen is not in contact with the wings.

Pieridae (whites): Most of these species generally have white, yellow or pale blue wings, and the abdomen is cradled in a section of the hindwing. The colours on the wing of this family are all derived from uric acid.

Nymphalidae: This is a polyglot family in which several former families such as the Satyridae, Danaidae, Acraeidae, Libytheidae and Amathusidae have been included.

Lycaenidae (blues and hairstreaks): These are small, generally blue butterflies

Hesperioidea (skippers): These are sometimes not treated as butterflies since they have hooked antennae and several physical characters that distinguish them from true butterflies. This superfamily is represented in India by the family Hesperidae.

pers (**Hesperidae**) are not dealt with, all the butterflies known at the time from the remaining families were covered. L de Nicéville's butterfly collection today is a part of the National collections at the Zoological Survey of India, Calcutta.

Other books on Indian butterflies followed, often lavishly illustrated, but correspondingly expensive. The ten volumes of '*Lepidoptera Indica*' by Frederick Moore and C Swinhoe, published between 1890 and 1913 cost about 90 pounds sterling, which was more than what an average worker earned in a year at the time. After the First World War, cheaper books became available. The most popular was probably Brigadier W H Evans' '*The Identification of Indian Butterflies*' which cost a little over one pound. This book is to date the only one which covers all Indian butterflies in a single volume, except for species described after the last edition of the book in 1932.

Once names were available for the various butterflies, information began to pour in from all parts of India. Local lists were published, early (pre-adult) stages described and interesting



habits and unusual behaviour patterns were discovered. The main thrust, however, was the naming of species and the process of distinguishing sub-species from true species. A major refinement was the beginning of the study of genitalia at the turn of the last century. Prior to this, the study of superficial structures, such as the wing pattern, the structure of veins in the wings, head and leg structure were the criteria used. The drawback with this was that it was not always easy to separate closely related species based on such characters.

Butterflies vary individually, seasonally and geographically. Some species do not vary at all throughout their range, while some have different patterns on their wings or go so far as to assume a different wing shape in different localities or at different seasons. Similarly, behaviour, including choice of host plant, can vary from region to region in the same species. Work on genitalia greatly helped in resolving confusion regarding the status of various species and sub-species, since the structure of these organs does not vary much within a species. Even then, there are some cases where the genitalia are of no help. In such cases, one must breed the species and look for differences in the larvae and pupae.

Given all these exceptions, it becomes clear why a number of butterfly species continue to be discovered in India even now. The most recently described species is the Nilgiri grass yellow (*Eurema nilgiriensis*) which was discovered by the Japanese researcher, Osamu Yata, in 1990. The grass yellows are little



Figure 3. The most recently described Indian butterfly, the Nilgiri grass yellow, *Eurema nilgiriensis* which was described by Osamu Yata in 1990. (lifesize) Credit: Basil Wirth. Specimen in Coll. B Wirth.

Box 3. Unknown Indian Butterflies

Some Indian butterflies still remain unknown. Two that are known to be unknown (an unusual state of affairs!) are females of the Naga hedge blue (*Oreolyce dohertyi* Tytler) and males of the south Nicobarese population of the common hedge blue (*Acytolepis puspa prominens* de Nicéville). The Naga hedge blue is known only from four males collected in the Naga hills and described in 1915. *A. puspa prominens* is known from two females taken in the south Nicobars and described in 1890. *A. puspa* has a very large distribution, from Sri Lanka to Japan and Afghanistan to the Moluccas with 20 recognised sub-species. Both are small butterflies with dusky bordered blue wings that belong to a large and complicated group of butterflies found in the hills of India.

Suggested Reading

- [1] B L D'Abrera, *Butterflies of the Oriental Region*, Ferny Creek, Victoria, Vols. 1-3, 672 p, 1982-1986.
- [2] W H Evans, *The Identification of Indian Butterflies*, Bombay Natural History Society, Mumbai, 2nd edition, Reprint by Today and Tomorrow's Printers and Publishers, New Delhi. 454 pp. 32 pl, 1932.
- [3] M A Wynter-Blyth, *Butterflies of the Indian Region*, Bombay Natural History Society, Mumbai, Reprinted by Today and Tomorrow's Printers and Publishers, New Delhi, xx + 523 pp. 72 pl. 1957.

butterflies with black bordered yellow wings that gather by the hundreds on riverbanks and wet mud. There are five species of grass yellows in the Nilgiris, besides the Nilgiri grass yellow. While examining series of these butterflies in different collections, Yata was convinced that a very slight variation in the shape of the black border of the forewing represented members of a new species. Given the fact that grass yellows are also prone to considerable seasonal and individual variation, it took an artist's eye to distinguish the regularity of the variation.

The result of a comparison of genitalia of the suspicious looking butterfly with the species with which it had been confused established beyond doubt that it was a separate species. Subsequently, specimens of the new species were discovered in most of the old collections made in the area. Although this butterfly existed in collections for over a century prior to its discovery, it was not recognised as a distinct species until Yata's work in 1990.

In the 232 years between the publication of the descriptions by Linnaeus and Yata, 1501 species of butterflies have been discovered in the Indian region. Although differences still exist among taxonomists about the correct names of some of them, there is a semblance of stability in nomenclature for the first time since the publication of Brigadier Evans' book.

This is certainly not the end of the matter. In fact, the process of discovering and naming is only the first step. One might say that the real work starts now, but that would belittle the tremendous amount of patient work that has gone into making the list of 1501 names of butterflies from India. Suffice it to say that it took over two centuries and immeasurable toil and hardship to compile that list!

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An old French geometer used to say that a mathematical theory was never to be considered complete till you had made it so clear that you could explain it to the first man you met in the street.

– H J S Smith

Quantum Chemistry and Spectroscopy