

SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE.

OBSERVATIONS
ON THE
BATIS MARITIMA

OF LINNÆUS.

BY

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BATIS VERITATIS OF LINNÆUS.

BY JOHN TORREY, F.R.S.

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OBSERVATIONS
ON THE
B A T I S M A R I T I M A O F L I N N Æ U S .

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THE *Batis maritima* is a common maritime shrubby plant of the West India Islands and the neighboring parts of the continent; but it is surprising that no correct description of its flowers and fruit has hitherto been published, nor has its place in the Natural system been satisfactorily determined. Lindley says, "that British botanists should be ignorant of the structure of one of the commonest plants in one of the oldest colonies is certainly a thing not to be proud of."\*

The plant appears to have been first noticed, more than one hundred and fifty years ago, by Sloane, in his Catalogue of the Plants of Jamaica,† and afterwards in his history of that island,‡ under the name of *Kali fruticosum coniferum, flore albo*. He gives no description of the plant, except what is contained in this phrase, and merely adds one or two observations respecting its uses.

In 1756, P. Browne, in his Civil and Natural History of Jamaica,§ first gave this plant its present generic name; and his description is very good, considering the time when it was published.

Linnaeus briefly characterized the genus in the second edition of his *Species Plantarum* (1763),|| but he gave no additional information respecting it, and seems to have drawn his description entirely from Browne. The only habitat that he records is Jamaica.

In the *Stirpium Americanarum Historia* of Jacquin, published in 1763,¶ is a good description (except of the male flowers and the fruit), with a rude figure of the plant. There is another figure of it in the *Plant. Amer. Pict.*,\*\* of the same author, a scarce work, without date, which I have never been able to find. It seems to be a later edition of the *Historia*, with more numerous and colored plates.

\* Hook. Lond. Jour. Bot. 4, p. 1.

† Page 50 (1696).

‡ I. p. 144 (1707).

§ History of Jamaica, i. p. 356.

|| P. 1451.

¶ P. 261, t. 40, f. 4.

\*\* P. 246.



The small volume of Jacquin, entitled *Selectarum Stirpium Americanarum Historia*, published in 1788, contains only the text of the larger work of 1763, with references to the colored plates. The description of *Batis* is not altered.

Lamarck's figure of *Batis*\* seems to be a copy of Jacquin's, already cited.

Swartz, in his *Observationes Botanicae* (1781), gives a detailed character of the plant, which is, in some respects, more accurate than that of Jacquin; but he, too, has overlooked the petals; and the fertile flowers as well as the fruit are imperfectly described.

Jussieu, in his *Genera Plantarum*,† has drawn the character of the genus from Browne and Jacquin, and seems to have been unacquainted with the plant. He left it among his *genera incertae sedis*.

Willdenow‡ and Persoon§ copy the short description of Linnæus, and add nothing to our previous knowledge of the plant.

In 1814, appeared the extensive *Flora Jamaicensis*, by John Lunan. His description of *Batis* is very full,|| but is wholly taken from Jacquin, with some additions from Browne, and he makes no conjecture as to its affinities.

Kunth notices the plant in his *Nova Genera et Species*, and places it among *Chenopodiaceae*.¶

Sprengel, in 1826,\*\* referred it, doubtfully, to *Coniferae*. In his *Genera Plantarum* (1830) it stands without a reference to the Natural order.

Bartling, four years later, leaves it, without a remark, among his undetermined genera.††

Even so late as 1840, Endlicher seems to have had no better materials for the character of *Batis* in his *Genera Plantarum*‡‡ than the description of Jacquin; which he has copied, with only slight alterations. In doing so, however, he has made two verbal mistakes, viz.: "*ovarium acutum*" for "*ovarium obtusum*;" and perigonium *decumbens*" for "*disrumpens*." Like Bartling and Jussieu, he does not assign the genus a place in the Natural system.

The only important addition to our knowledge of this interesting plant, since the time of Jacquin, is given by Lindley, in his remarks on the genus *Sarcobatus* of Nees, in the fourth volume of Hooker's *London Journal of Botany*.§§ He correctly describes the structure of the fruit, and rendered it probable (for his specimens were not mature) that what had been regarded as seeds by former botanists, were only the empty and easily separable carpels; the plant rarely perfecting its seeds.

Several years ago, the *Batis* was detected at Tampa Bay, in East Florida, by that zealous botanist, Dr. M. C. Leavenworth, late of the United States Army, who has contributed so much to our knowledge of Southern plants. It was shortly afterwards found by Mr. J. Blodgett, on Key West Island. From this gentleman, I lately received ripe and perfect specimens, preserved in alcohol. Dr. Chapman has also sent me excellent dried specimens of both male and female plants from

\* *Illustr. des Gen.* t. 806.

§ *Synops.* 2, p. 613 (1807).

\*\* *Syst. Veg.* 3, p. 901.

‡‡ No. 6844, p. 1327.

† P. 443 (1789).

|| 2, p. 137.

†† *Ordin. Nat. Plant.*, p. 426 (1830).

§§ P. 1 (1845).

‡ *Sp. pl.* 4, p. 735 (1807).

¶ 2, p. 193 (1816), and *Synops.* 1, p. 479.



East Florida. With these ample materials, I am able to give a more complete description of the plant than has yet appeared, and to determine, with considerable certainty, its place in the Natural system.

BATIS, *P. Browne, Hist. Jamaic. 1, p. 356.*

Flores dioici, in spicas conico-oblongas quadrifariam dispositis. *Mas.* Flores distincti. Bracteæ lato-cordatæ, obtusæ, vel brevissime acuminatæ, concavæ, integræ, persistentes, arcte appressæ. Calyx disepalus; sepalis in cyathulam compressam truncatam sub-bilabiatam coalitis, bracteæ subæqualibus. Petala 4, subunguiculata; limbo subrhomboideo. Stamina 4, petalis alternantia, exserta: filamenta subulata, glabra: antheræ oblongæ, incumbentes, versatiles; loculis distinctis introrsim longitudinaliter dehiscentibus. Pollinis granula minutissima, simplicia, spherica. *Fem.* Flores in spicam carnosam coaliti. Bracteæ ut in mare, deciduæ, duobus infimis connatis. Calyx et corolla desunt. Ovaria inter se et cum basi bractearum coalita, quadrilocularia. Ovula in loculis solitaria, e basi erecta, anatropa. Stylus nullus: stigma capitato-subbilobum. Pericarpia 8-12, quadrilocularia, in syncarpium ovoideo-conicum tuberculosum carnosum coalita; loculis monospermis: endocarpium coriaceum. Semina oblonga, erecta, rectiuscula: testa tenui, membranacea. Embryo exalbuminosus semine conformis: cotyledones carnosæ, oblongæ, compressæ: radícula brevis, hilo proxima.—Frutex Antillanus, et vicinæ Continentis, littoralis; caulibus prostratis ramosissimis; foliis oppositis, exstipulatis, oblongo-linearibus, basi attenuatis, succulentis, supra planis, subtus convexis; spicis solitariis, sessilibus, viridibus.

#### BATIS MARITIMA, Linn. TAB. XI.

*B. MARITIMA*, Linn. Sp. Pl., p. 1451; Jacq. Stirp. Amer., p. 261, t. 40, f. 4; Plant. Amer. Pict., t. 246; Select. Stirp. Amer., p. 335; Swartz, Obs. Bot. p. 373; Willd. Spec. Plant. 4, p. 735; Pers. Synops. 2, p. 613; Lunan, Hort. Jamaic. 2, p. 137; Kunth, Nov. Plant. Gen. et Spec. 2, p. 193; Synops. 1, p. 479; Spreng. Syst. Veget. 3, p. 901.

*B. maritima* erecta ramosa, foliis succulentis subcylindricis, *P. Browne, Hist. Jamaic. 1, p. 356.*

*Kali fruticosum coniferum*, etc., Sloane, Catal. Jamaic., p. 50; Hist. Jamaic., p. 144.

*HAB.*—On the sea shore, and the margin of lagoons; flowering nearly all the year. Tampa Bay, East Florida: Dr. Leavenworth. Southern Florida: Dr. Chapman. Key West: Mr. J. Blodgett. Also in Jamaica, Cuba, and other of the West India Islands; and on the neighboring parts of the Continent.



Within the limits of the United States, this plant has been found only in the stations here noticed. It is probable that Tampa Bay, the latitude of which is about 33°, is the northern limit of its range.

In Carthage, and some other places where it abounds, the plant is burned for the sake of an impure carbonate of soda contained in its ashes. It is also used for pickles.

The plant is commonly prostrate, with numerous branches, which spread on the ground to the extent of three or four feet. Every part of it is quite glabrous, and of a strong saline taste. The leaves are opposite, about an inch in length, oblong-linear, narrowed downwards, and very fleshy. They are flattish above and rounded underneath, and are without stipules. The staminate and pistillate flowers are on different individuals, and both kinds are disposed in dense, oblong, four-rowed spikes, which are solitary and sessile in the axils of the leaves. They are about one third or a quarter of an inch long. In the staminate spikes there are from twelve to sixteen flowers, each subtended by a roundish or broadly cordate and somewhat persistent scale or bract. The calyx is a little cup, consisting of two sepals, which are anterior and posterior with respect to the axis, and are united below the middle. The cup is compressed and somewhat two-lipped; the lower lip slightly cucullate and cristate transversely just below the margin. There are four unguiculate white petals, with the limb rhombic-ovate, erose-denticulate on the margin, and abruptly narrowed at the base into a claw which is nearly as long as the limb. Alternating with the petals, and about equal to them in length, are four stamens. The filaments are subulate and glabrous; the anthers yellow, oblong, fixed by the middle, two-celled, introrse, with a longitudinal dehiscence. The pollen is simple and spherical. There is no trace of a pistil. The fertile spikes are seldom more than eight or ten-flowered, and are furnished with bracts similar to those of the sterile flowers, but which are much more caducous. There are no floral envelopes, nor even rudimentary stamens. The ovaries of all the flowers in one spike grow together, except at their upper part, and perhaps the bases of the bracts are united with them. Each ovary is four-celled, in all my specimens, but there are five and six cells represented in the figure of Lindley.\* In each cell there is a single anatropous ovule, which is supported on a long stalk that rises from the base. There is no style, and the thick, capitate, pubescent stigma is slightly two-lobed. The fruit is half an inch or more in length, and is composed of from eight to twelve drupaceous pericarps, which are united into an oblong, obtuse, fleshy, tuberculate head. Each pericarp is four-celled, with a single seed in each cell. The endocarp is tough and coriaceous. Until its nature was determined by Lindley, it had always been mistaken for the testa. The seed is oblong and nearly straight, erect, with a thin and membranaceous testa, and is destitute of albumen. The embryo is conformed to the seed, with fleshy oblong cotyledons, and a short, somewhat oblique radicle which is placed next the hilum.

Only a single species of *Batis* is known. Lindley has ascertained that the East Indian shrubs referred to this genus by Roxburgh and Wallich have no affinity with

\* Vegetable Kingdom, p. 286.



Batis, and that they belong to Urticaceæ, being near allies of Morus. He also states\* that, in the herbarium of Sir William Hooker, there is a Texan plant, in a state too young for examination, which may be a second species of this genus.

The Batis (?) vermicularis of Hooker† is my former Frémontia,‡ a Chenopodiaceous plant, which I described several years ago as a new genus, without being aware at the time that it had shortly before been published by Nees, under the name of Sarcobatus.§ That plant has strangely been omitted by M. Moquin, in his recent and most excellent elaboration of the Chenopodiaceæ, in De Candolle's Prodrômus. In Frémont's Reports (both of which M. Moquin has consulted and quoted), it was fully described and figured, with analyses of the fertile flowers and fruit; and was clearly shown to belong to that family. He must also have seen specimens of it in Sir William Hooker's Herbarium.

From the history of Batis already given, it is seen that very discordant opinions have been entertained by botanists as to its affinities. Although Jussieu, Bartling, Endlicher, and others have allowed it to remain among "*genera incertæ sedis*;" some have been inclined, more on account of its habit than from any correct views of its structure, to place it among Chenopodiaceæ. To Coniferæ, where it was referred by Sprengel, it has no resemblance whatever. Martius|| arranged it between Podostemaceæ and Salicaceæ, but without giving any reasons for so doing; and, moreover, he has indicated it (without a character) as the type of a proper Order. The station assigned to it by Meisner¶ is immediately after Urticaceæ, probably from the remarks of Lindley, to which allusion has already been made.

Lindley, in his latest work,\*\* placed it, until better known, in the Euphorbial Alliance; and, with much sagacity, conjectured that it might belong to Empetraceæ; at the end of which he has appended it. With that Order it agrees in its diœcious flowers, definite stamens, several-celled ovary, erect anatropous ovules, drupe-like fruit, and inferior radicle. It differs, however, in habit; in the want of imbricated scaly sepals or bracts; in the presence of a true corolla; and, especially, in the seed being destitute of albumen.

Considering the importance of most of the distinctive characters, it seems most probable that Batis should be regarded as constituting a proper natural Order, and that its station should be in the immediate vicinity of Empetraceæ.

\* Vegetable Kingdom, p. 286.

† Flora Boreali-Americana, 2, p. 128.

‡ Botanical Appendix to Col. Frémont's Report of his First Exped. (1843), p. 95; and Second Report (1845), p. 317, t. 3.

§ This genus was first described in a Botanical Appendix to Prince Maximilian's Travels in North America, a rare and costly work, of which an English translation was published in 1843. In the Botanische Zeitung for 1844, Dr. Seubert published a description of the plant, with a figure (p. 753, t. 7); but he did not determine its place in the Natural System. As Nees's name has the priority, I have dedicated to Colonel Frémont another and very remarkable Californian plant, of which there is a description and figure in an earlier memoir of this volume.

|| Conspectus, p. 13.

¶ Plantæ Vasculares, p. 349.

\*\* The Vegetable Kingdom, p. 286 (1846).



Since the preceding memoir was written and prepared for press, I have received from Dr. C. C. Parry, who was attached to the Mexican Boundary Commission as Botanical Assistant to Major Emory, a specimen of a *Batis*, which he found in a salt marsh, near San Diego, California. The only specimen brought away by Dr. Parry is a male. It differs from the common *Batis* in its much broader and considerably shorter leaves, and in the staminate flowers being furnished with a filiform central organ that resembles an abortive pistil. This last is totally destitute of an ovary, and bears a small stigma-like head, which contains imperfect pollen; so that the body is rather to be regarded as an abortive stamen than a pistil. From these characters, it is probable that the Californian plant is new. The two species may be distinguished by the following diagnosis:—

*B. MARITIMA* : foliis oblongo-linearibus ; floribus masculis sine corpore centrali filiformi.

*B. CALIFORNICA* : foliis obovato-oblongis ; floribus masculis corpore centrali filiformi apice capitato instructis.

## EXPLANATION OF THE PLATE.

### PLATE XI. *BATIS MARITIMA*. TAB. XI., PAGE 5.

- |                                                                        |                                                          |
|------------------------------------------------------------------------|----------------------------------------------------------|
| FIG. 1. A branch, with spikes of male flowers ; of the natural size.   | FIG. 11. A spike of female flowers, moderately enlarged. |
| 2. A branch, with spikes of female flowers ; also of the natural size. | 12. One of the bracts, more magnified.                   |
| 3. A male spike, magnified.                                            | 13. Longitudinal section of the same.                    |
| 4. Longitudinal section of the same, more highly magnified.            | 14. Transverse section of the female spike.              |
| 5. One of the bracts, magnified.                                       | 15. An ovule, highly magnified.                          |
| 6. Plan of the male flower.                                            | 16. The fruit, of the natural size.                      |
| 7. A male flower, unexpanded and magnified.                            | 17. Longitudinal section of the same.                    |
| 8. The same, without the calyx, and expanded.                          | 18. A portion of the same, pretty highly magnified.      |
| 9. Front view of a stamen, magnified.                                  | 19. Transverse section of the fruit, less magnified.     |
| 10. Back view of the same, also magnified.                             | 20. A seed, magnified.                                   |
|                                                                        | 21. The embryo, equally magnified.                       |

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