

Phycological Trailblazer

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Giovanni Zanardini

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Giovanni Antonio Zanardini (1804-1878) was born in Padua, Italy. Although he was plagued with ill health during much of his childhood, he showed a keen interest in learning, along with an early fascination with plants, especially flowers. As an adult he would continue to show this interest in his cultivation of many varieties of *Camellia*. Receiving the classical education of the period, he was regarded as an exceptional student through the primary and secondary levels of school. He was admitted to the University of Padua, where he studied law for two years. But his performance was mediocre, and he realized that his true interest was in botany. So he applied for admission to the Faculty of Medicine at the same University, where he would also be able to study the natural sciences.

He obtained his medical degree from the University of Padua in November of 1831. The title of his dissertation for this degree was "The benefits of the use of botany to modern medicine" (Meneghini, 1881). So his inclination toward botany was still evident. Drawn to its stellar reputation in anatomy, surgery, and general medicine, Zanardini next enrolled at the University of Pavia, in southwestern Lombardy, where he completed their advanced program in surgery and obstetrics by April of 1834. During

this period he also came under the sway of Giuseppe Moretti (1782-1853), professor of botany and the director of the botanical garden of the University of Pavia.

Soon after completing his advanced education in surgery, Zanardini was offered the position of physician for the 'Casa di Forza' in Padua. His career in Padua included serving on a commission with the responsibility of maintaining standards of public sanitation. This task involved a role in fighting the cholera epidemic of 1836. Although a physician and surgeon by profession, botany and phycology in particular remained as his passionate avocations. During these years in Padua he began publishing the results of his studies, coming out of his strong interest in the algae.

He was especially intrigued by the

processes of reproduction in plants and the development of embryos. At this early time the distinction between reproductive and vegetative organs was still not fully understood. He also took advantage of the contemporary improvements in light microscopy to further his interests in histology. In 1839 he published a work with numerous illustrations of reproductive organs, in which he discussed their form and function. He described development of new colonies from reproductive cells in *Hydrodictyon*. Also, in 1839, he published the descriptions of 18 new species occurring in the Adriatic Sea (Zanardini,

1939). A treatment of the marine algae of the Adriatic Sea appeared in 1840.

In a monumental paper in 1842 he produced a discourse on his studies on the biology and morphology of algae, a treatment of the organization of a number of genera of siphonous green algae, including *Halimeda*,

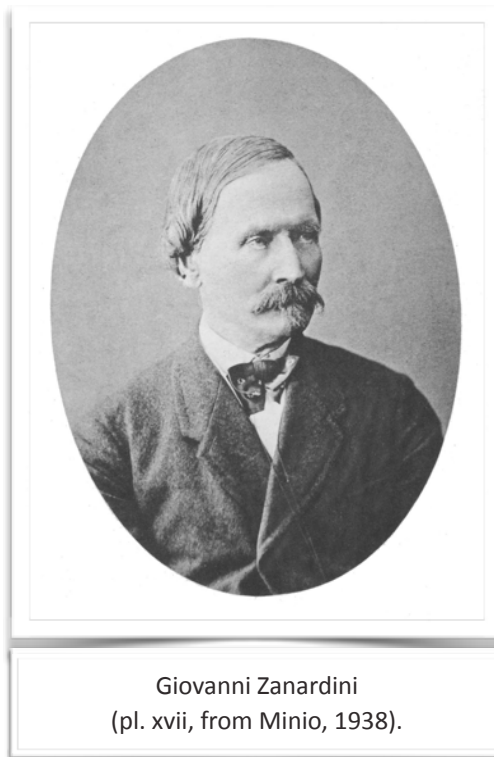




Fig. 1. *Gracilaria arcuata* Zanard. (1858, pl. V, fig. 2).

Dasycladus, *Anadyomene*, and *Udotea*, and a compilation of the species of marine algae recognized up to then as occurring in the Adriatic Sea. In his 'Saggio' (1843), presented to the Venetian Institute, Zanardini presented his innovative ideas on the "natural classification" of the algae, one scheme based on the morphological distinction between vegetative and reproductive organs and a second scheme based on what he regarded to be the functional aspects of vegetative and reproductive organs. It was an early attempt to arrange all known algal genera according to their natural relationships and thus was a significant departure from the proposals of C. Agardh, Decaisne, and Harvey (Meneghini, 1881). In a critical review of the reproductive structures of coralline algae, which were still being confused with corals, Zanardini's (1844) findings supported the contention made earlier by Philippi that non-geniculate corallines were algae (plants) rather than coral polyps (animals) (Woelkerling & Lamy, 1998).

After practicing medicine in Padua from 1834 to 1847, he requested and was granted a transfer as Chief Medical Officer to the Penal House of Correction in Venice. He began that assignment in April 1847 and served until his retirement in 1869. Zanardini did not restrict his attention to the algae of the Adriatic Sea. He published two important works on the marine

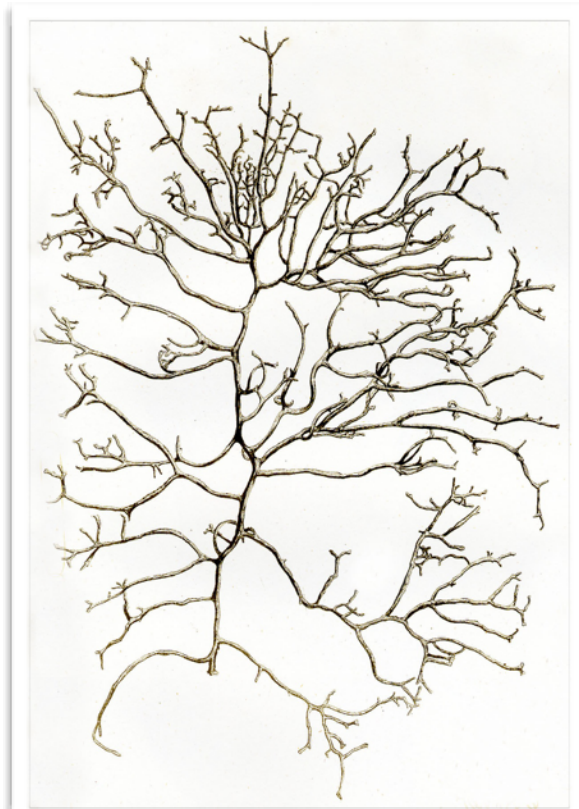


Fig. 2. *Mesogloia ramosissima* Zanard. (1858, pl. IV, fig. 2) [= *Myriogloea ramosissima* (Zanard.) Papenf.].

algae of the Red Sea on the basis of collections made by Portier and Antonio Figari. In the first work (1851) he described 22 new algal species and the new red algal genus *Portieria*. The 1858 work was the most comprehensive account on Red Sea algae up to that time (Papenfuss, 1968). It included several new genera (*Sarconema*, *Chloroplegma*, and *Dichothrix*) and some new species of green, brown, and red algae (Figs. 1 & 2).

Zanardini's botanical interests were broad. He developed a rich collection of phanerogamic plants that were donated to the Institute of Venice. He produced a catalogue of the cultivated plants of the Venezia Province with the goal of encouraging exchange with the U. S. In 1851 he also made contributions to understanding the mode of infection of the powdery mildew (*Uncinula necator*, or *Erysiphe necator*), the fungus that was then destroying



Fig. 3. *Asperococcus bullosus* J.V. Lamour.
(from Zanard., 1863, pl. XXV.)

the grapes vines of Europe. In the areas of the small brown spots on the undersides of the leaf he observed that the fungus produced small root-like structures that penetrated the leaf cells. He called these structures “fulcra”, but the preferred term “haustoria” was later used (Large, 2003). He made histological observations of the epidermis of desert plants and made experiments on their release of carbonic acid, presenting some novel ideas of the physiology of the xeric plants (Zanardini, 1859-1860). In Venice, over a 17-year period, he published a series of fascicles with colored plates of the marine algae of the Mediterranean and Adriatic seas (Zanardini, 1860- 1876)(Figs. 3 & 4). This series included the description of some new taxa, such as the brown algal genus *Choristocarpus* and the red algal genus *Contarinia*. In 1872, he published on the collections made by the botanical explorer and palm specialist Odoardo Beccari from Borneo (Indonesia), Singapore, and Sri Lanka. *Ceratodictyon*, a red alga that was an unusual



Fig. 4. *Chrysymenia digitata* Zanard. (from Zanardini, 1863, pl. XXVIII) [= *Chrysymenia ventricosa*].

symbiotic combination of an alga and a sponge, was a new genus based upon a Beccari collection from the Moluccas in eastern Indonesia (Zanardini, 1878). He also worked up collections made in Australia (from Tasmania, Port Phillip in Victoria, and Lord Howe Island) (Zanardini, 1874).

Zanardini was awarded the first prize at the International Marine Exposition held in Naples in 1871. He was declared an Officer of the Royal Italian Crown by the King in 1874. Meneghini (1888) characterized Zanardini’s medical practice as solid, constant, and meritorious. Meneghini also provided a litany of praises to characterize Zanardini the person, that he was generous with his time, often serving as an officer in various scientific societies and as an impartial examiner on academic committees. Zanardini was also said to have a down-to-earth manner and an easy smile. A complete list of his publications was provided by Meneghini (1879), De Toni & Levi (1888), and De Toni (1921). His extensive herbarium and library were bequeathed to the city of Venice and now reside in the ‘Museo Civico di Storia naturale di Venezia’ (De Toni & Levi, 1888).

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