

## Georges Guerrard-Samuel Perrottet, a forgotten Swiss–French plant collector, experimental botanist and biologist in India

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The first French trade outpost was set up in the coastal town of Pondichéry, now Puducherry (11°93'N, 79°79'E), southern India by the French East-India Company (Compagnie Française pour le Commerce des Indes Orientales) in 1674. This outpost grew into the earliest French settlement. Its activities driven by commercial interest got triggered. One was the exploration – which turned subsequently as exploitation – of the natural wealth of India. That in turn, led to the consideration of growing plants in a formal ‘garden’ context, because established gardens existed in France: Jardin du Roi in Paris initiated by Joseph Pitton de Tournefort and Antoine de Jussieu, pioneering botanists of the day, was operational from 1640.

An early ‘garden’ seems to have existed in Pondichéry in 1740, although a formal garden, spreading over 17.5 ha, was established only in 1826 consisting of two sections: the Royal Garden (Jardin du Roi) and the Colonial Experimental Garden (Jardin Colonial et d’Acclimation)<sup>1</sup> situated between the South Boulevard and the Oupar stream (note 1) in the southeastern part of Pondichéry. Efforts were made to grow the Shirazi tobacco (*Nicotiana tabacum*, Solanaceae, from Shiraz, Persia (now Iran), considered the finest Persian tobacco), Dacca cotton (*Gossypium herbaceum*, Malvaceae, also known as the source of the fine ‘Dhaka muslin’ material from Dacca, Bangladesh), sugarcane (*Saccharum officinarum*, Poaceae), and mulberry (species of *Morus*, Moraceae) in 1826–1828 (ref. 2). By 1829, the garden area shrunk to c. 11 ha, included about 900 plants, and was more of an experimental garden (ref. 3, note 2). According to Jacquemont (ref. 3, pp. 258–259):

‘True efforts were made to study the behaviour of a good number of plants, in the climate of Pondichéry, though those experiments were not conducted with the necessary rigour and method at that time.’

The Botanic Garden of Pondichéry (Jardin Botanique de Pondichéry, JBP) along

the eastern coast of Peninsular India shot into prominence in recent years, when Ang Lee made a few segments of his Oscar runner *The Life of Pi* (2012) here. With spectacular flowering plants and refreshing water features, JBP has remained a fascinating recreational facility in Pondichéry for several years. The 2011 cyclone ravaged JBP and it has not yet recovered from the damage. Cyclonic rain and other natural events have irreparably damaged similar human creations in Peninsular India in the past. The Marmelon Botanic Garden in Madras city (13°02'N, 80°23'E), India, created by James Anderson and managed by his nephew Andrew Berry in 1790s, was lost permanently due to the torrential cyclone that hit Madras in December 1807 (refs 4 and 5).

The floral and faunal elements of Pondichéry interested the French administrators and visitors. The earliest name that resonates in Pondichéry’s biology is Pierre Sonnerat (1748–1814). Sonnerat travelled to India and China between 1774 and 1781. His *Voyage aux Indes Orientales et à la Chine, Fait Ordre du Roi, Depuis 1774 Jusqu’à 1781* is remarkable. Sonnerat mostly looked at birds in these nations, although he was equally interested in the landscape, people and plants. Jean-Baptiste Louis Théodore Leschenault de la Tour (1773–1826) came to Pondichéry in 1816, after the Napoleonic battle to establish a botanic garden to be named le Jardin du Roi de Pondichéry, although it did not materialize. Leschenault de la Tour collected not only plants, but also worked on the biology of fishes and birds of India<sup>6</sup> and returned to Paris in 1822. The other French naturalists who contributed to the natural history of Pondichéry and other French territories in India, e.g. Yanam and Chandranagore, for short spells of time were François Louis Busseuil (1791–1835), Charles Paulus Bélanger (1805–1881) and A. M. M. Reynaud (1804–?). Georges Perrottet took charge as the Director of JBP in 1840. Most of JBP’s botanical novelties and star attractions came into existence only due to the efforts of Perrottet.

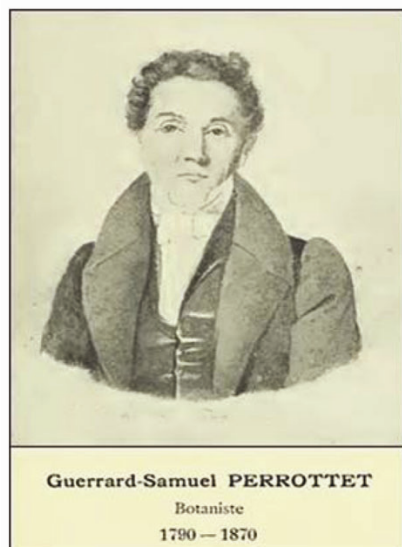
The only item that celebrates Perrottet is the obelisk in JBP (Figure 1).

### Georges Guerrard–Samuel Perrottet

Perrottet (Figure 2) was born in 1790 (1793?) in Vully of Vaud Canton of French-speaking Switzerland. He started



**Figure 1.** The Perrottet memorial at Jardin Botanique de Pondichéry (photo courtesy: S. Prasad, l’Institut Française de Pondichéry, Puducherry).



**Figure 2.** Perrottet [photo by Albert Gockel (note 18), published in the *Bulletin de la Société Fribourgeoise de Sciences Naturelles, Comptes Rendus*, Fribourg, 1900].

as a gardener at the Vaudois Botanic Garden, Fribourg, Switzerland. He joined as the Naturalist in the expedition led by Captain Pierre Henri Philibert (note 3) in 1819–1821. Perrottet's duties on this expedition were to collect rare and useful plants from Réunion, Java and the Philippines, and cultivate them in French Guyana<sup>7,8</sup>. In 1824–1829, Perrottet explored Senegambia (Senegal and Gambia, today), where he was the general manager of the French trade office. At this time, he introduced the nopal cacti (several species of *Opuntia*) into Senegal. Interest in the *Opuntia* and the cochineal insects was profound during this period and many of the colonial administrators and naturalists were excited in growing the species of *Opuntia* for raising the dye-yielding scale insect (*Dactylopius opuntiae*; Hemiptera: Dactylopiidae) in their respective tropical colonies<sup>5</sup>. Collaborating with Jean-Baptiste Antoine Guillemain (note 4; 1796–1842) and Achille Richard (note 4), Perrottet published the *Florae Senegambiae Tentamen* in 1833. He was appointed the Economic Botanist (Botaniste Agricole) at JBP during 1834–1837. While returning to St Helena, travelling through the Malabar Coast, the Nilgiris, Poona and Bombay, he collected plants *en route* during 1837–1839. The botanical collections and experiments made during his travel and stay

(estimated six months) in the Nilgiris (11°25'N; 76°41'E) have been treated separately in this note. Back in Paris, with support from the Ministry of Marine and Colonies Department of France, Perrottet searched for the best methods to rear silkworm (*Bombyx mori*; Lepidoptera: Bombycidae) in southern France in 1839–1840 and made efforts to introduce silk industry in Cayenne, Martinique and Guadeloupe. While searching for *Coffea* (Rubiaceae), he found the coffee-leaf miner that ravaged coffee plantations in the French Antilles. He studied the biology of this insect and named it *Elachista coffeella* (presently *Leucoptera coffeella*; Lepidoptera: Lyonetiidae), collaborating with Guérin-Méneville<sup>9</sup> (note 4). Guérin-Méneville and Perrottet refer to a pathogenic fungus in this memoir<sup>9</sup>, which possibly is *Hemileia vastatrix* (Pucciniomycetes: Pucciniaceae). Accepting the appointment as the Government Botanist (Regierungsbotaniker<sup>10</sup>) with a responsibility to direct JBP, Perrottet returned to Pondichéry, travelling via and collecting plants in Aden, Bombay, Calicut and the Nilgiris in October 1842. He held this office until his death in Pondichéry in 1870. He was succeeded by J. Contest-Lacour, who is recognized by Joseph Hooker for finding the economically useful plant *Pseudodracontium lacourii* (Araceae) from Cochinchina (Khmer part of Vietnam)<sup>11</sup>.

Given that production of silk was eliciting interest and excitement in the early decades of the 19th century (ref. 12, pp. 1–6), the credit for introducing a variety of mulberry into France goes to Perrottet, which he named *Morus multicaulis* (ref. 13, p. 129). Perrottet brought large collections of different tropical plants of economic relevance to Paris when he returned to France in 1821. One of them was *M. multicaulis*, saplings of which were deposited in the Royal Botanic Garden of Paris and some of them were cultivated in Lyon. Perrottet collected *M. multicaulis* from the garden of a Chinese cultivator on the banks of the *Pasig* River in Manila<sup>14</sup>. [Presently, *M. multicaulis* is a valid variant of *Morus alba*<sup>15</sup>.] *Morus multicaulis* (popularly known as the Perrottet mulberry) was considered a better host plant for the silkworm *B. mori* than *M. nigra* and to some extent even better than *M. alba*, which was already known in Europe<sup>16</sup>. An anonymous writer – identified as an authority on silk culture by the editor of the *Journal of the*

*American Silk Society and Rural Economist* (Baltimore) – says the following in the context of *M. multicaulis* (ref. 17, p. 153; note 5):

‘Having just referred to the *multicaulis* and its varieties, we take the occasion to protest against the names *Chinese* and *Canton* mulberry, frequently applied to the genuine *multicaulis* of Perrottet. The French botanist (*sic.* Perrottet) found the parent of what he called the *multicaulis* tree – the same now so extensively cultivated among us (*sic.* in America) – not in China, but in the Philippine Islands. It is distinguished for producing the largest leaves of any mulberry known, these having a peculiar bowl shape. So far as we have any evidence, this tree is not found in China. But they have in that country, varieties of the mulberry which very much resemble the *multicaulis*. Many of these are now growing in this country from seed brought from Canton. ... The leaves are large but less than those of the genuine Perrottet *multicaulis*. They are not puckered and bowl-shaped, but perfectly flat. ... To call the genuine *multicaulis* of Perrottet the Chinese or Canton mulberry is obviously very improper, as these names are only applicable to the product of seed imported from the Celestial Empire (note 6).’

Perrottet is also responsible for introducing the Cayenne variety of pineapple (*Ananas comosus*, Bromeliaceae) into France<sup>18</sup>. Although other varieties of *A. comosus* were popular in Europe from 1690, the Cayenne variety from French Guyana brought by Perrottet was different from its allies by its spineless leaves and delicately flavoured fruits averaging 20 lb (9.08 kg) in mass (ref. 18, p. 103) (also see note 7).

A comprehensive list of Perrottet's publications and citations made of his works by others, and detailed notes on his herbaria, known as the *Plantae Senegambiae* and *Plantae Pondicerianne*, are available in Stafleu and Cowan (ref. 19, pp. 174–177). Several plant names celebrate this indefatigable plant collector, experimental botanist and biologist. A group of south and southeast Asian terrestrial, carnivorous and pulmonate molluscs is named *Perrottetia* (Animalia: Gastropoda: Streptaxidae)

after Georges Perrottet of Pondichéry by Wilhelm Kobelt of Senckenberg Museum, Frankfurt, Germany in 1906.

### At the Nilgiris

#### *Establishment of Camellia sinensis*

Seeds of the tea plant, then known as *Thea viridis* (presently *Camellia sinensis*, Theaceae), brought by George James Gordon from China at the directive of the then Governor General William Bentinck, were introduced in an experimental farm at Kétti in 1835 (ref. 20, p. 510). This farm was established in Kétti village (11°40'N; 76°70'E), the Nilgiris, by Stephen Lushington, Governor of the Madras Presidency, who entrusted its management to Lt. Col. Richard Crewe, the British Commandant of the Nilgiris in 1828–1830 (Philip Mulley, e-mail, pers. commun., 11 August 2014). With Crewe's death in 1836, this farm was neglected. The Government at Fort St George, Madras, rented a mansion (note 8) in Kétti village to General de Saint Simon (note 9), the Chief of French establishments in India. de Saint Simon instructed Perrottet to go to Kétti to rejuvenate the dying *C. sinensis* plants. On arrival at Kétti, Perrottet found (ref. 21, p. 108):

‘... these tea plants, to the number of nine, very stunted, and hardly a few inches high, but still alive.’

Perrottet found that the position of the roots in the context of the soil they were planted was the cause for their poor performance. He says (ref. 21, p. 108):

‘The part of the stalk (stem) above the vital joint (root–stem junction), intended to live in or be exposed to the air, was found buried a foot at least. I had them bared to the roots; I cut off the decayed roots and made around each plant a large hollow, in which I spread an inch of good mould, formed of decayed vegetable matter, and watered them moderately. In a month after, young sprouts made their appearance and continued to grow gradually, – so that, when I left the hills in April 1837, these precious plants were two or two and a half feet high, and were loaded with branches and leaves of the finest growth.’

After Perrottet left the Nilgiris, the plants degenerated due to poor management. On return to the Nilgiris in January 1838, he restored them, repeating what he did in 1837. John Sullivan (note 10) and Ross King (note 10) were surprised to see the growth which Perrottet could re-establish in the plants that were mis-managed during his absence from the Nilgiris. Perrottet continues to say (ref. 21, p. 108):

‘When I finally quitted the Neilgherries, on the 18th of October 1838, my young teas were loaded with flowers, fruit and leaves – these last were of the greatest beauty, broad, and of a very remarkably bright green – the flowers also were very large and emitted a very sweet odour.’

John Sullivan obtained leaves from tea plants established by Perrottet in Kétti in 1840. He had them dried in the ‘open’ (air-dried) first, in a frying pan later, and sent them to the Agri-Horticultural Society office in Madras (note 11). The ‘tea’ made from those leaves in Madras was judged ‘excellent’ by the enthusiasts, who tasted it<sup>22</sup>. The earliest commercial launch of tea as plantations was made by one ‘Mann’ (note 12) in 1856, whose estate came to be known in later days as the ‘Coonoor Tea Estate’. On the reason of non-viability, the Kétti farm, which included tea plants established by Perrottet was abandoned in 1845.

#### *The Orchidaceae*

The *Monographie des Orchidées recueillies dans la chaîne des Nil-gherries (Indes-Orientales) par M. Perrottet*<sup>23</sup> describes details of the orchids collected by Perrottet from the Nilgiris. This monograph indicates that it is a reprint of the publication made in the *Annales des Sciences Naturelles, Botanique*, Paris in January 1841. Each of the 12 plates includes notations at the top left as ‘Ann. des. Scienc. nat. 2<sup>e</sup> Série’, and at the top right ‘Bot. Tom. 15, Plate 1’, indicating that the illustrations from the original publication were re-used in this monograph. At the bottom left of each plate, the notation ‘A.R. det.’ (note 13) occurs, implying that the determinations were made by Achille Richard, and at the bottom right refers to the name of the engraver ‘Melle Taillant sc’ (Miss E Taillant).

**Table 1.** Orchids collected by Perrottet from the Nilgiris and described by Achille Richard (AR) in 1841

Tribe, genus	Species described	Novelty described by AR
Malaxideae		
<i>Oberonia</i>	2	1
<i>Coelogyne</i>	2	2
<i>Liparis</i>	3	3
<i>Bulbophyllum</i>	1	1
<i>Dendrobium</i>	1	1
<i>Eria</i>	2	2
Vandaeae		
<i>Aerides</i>	1	1
<i>Birchea</i>	1	1
<i>Oeonia</i>	1	1
<i>Calanthe</i>	1	1
Ophyrdeae		
<i>Peristylus</i>	3	3
<i>Habenaria</i>	10	8
<i>Satyrium</i>	4	3
<i>Spiranthes</i>	3	2
Neottieae		
<i>Goodyera</i>	2	2
<i>Dryopeia</i>	1	–

Among the several hundreds of plants collected by Perrottet from the Nilgiris, Richard documents 38 Orchidaceae taxa, recognizing 16 genera and describing 32 novel species (Table 1). Of these 32, two celebrate Perrottet: *Calanthe perrottetiana* and *Habenaria perrottetiana*. Pages 1–9 refer to the floristic composition of the Nilgiris and Richard makes extensive comparisons with the flora of the Alps, with which he was obviously familiar.

#### *Thallophytes and bryophytes*

Jean-Pierre François Camille Montagne<sup>24</sup>, a Parisian botanist, who principally studied non-flowering plants, lists the fungi and bryophytes collected in the Nilgiris and sent to Paris Natural History Museum by Perrottet in the 1830s. Edwin Butler and Guy Bisby in *The Fungi of India* refer to Perrottet collections of the fungi in the Nilgiris<sup>25</sup>, but indicate the time as 1840s, which is incorrect. For example, *Hookeriopsis utacamundiana* (formerly under Hookeriaceae and now Pilotrichaceae<sup>26</sup>), a taxon described by Montagne in 1842 was collected by Perrottet in Ootacamund (Uthagamandalam). I found that Perrottet had collected marine algae as well, but could not track down any

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detail, except one citation by Murray<sup>27</sup> referring to *Scytonema coactile* (Cyanobacteria: Scytonemataceae) collected by Perrottet from the seas of French Antilles, West Indies.

### At Pondichéry

Besides managing JBP for more than a quarter of a century and building it to its present status, Perrottet wrote two monographs during his Pondichéry stay: *Art de l'indigotier (Traite des indigoferes tinctoriaux et de la fabrication de l'indigo)* (1842) and *Catalogue des Plantes du Jardin Botanique et d'Acclimation du Gouvernement à Pondichéry* (1867).

### On indigo plants and the dye

Although this monograph was published in 1842, when Perrottet<sup>28</sup> was directing JBP, his interest in the dye-yielding plants and extraction of the dye had started in 1832, when he was in western Africa (Senegal and other French colonies therein, where he worked). The details presented in this volume include his knowledge of and experiences with this plant elsewhere as well.

The Introduction (pp. 1–47) includes the following sections: history of indigo, earlier work on indigo and indigo extraction, general remarks, and a short contextual explanation of the organization of this volume into four chapters. Chapter I (pp. 48–80) refers to the botany and chemistry of *Indigofera* (Fabaceae) under the following sections: (i) the origin of the name *Indigofera* (Perrottet spells as *indigofera*, with an 'i' at the start) and the number of species known then, (ii) characters of the genus *Indigofera*, (iii) description of the species that have the dye-yielding capacity, (iv) chemical composition of indigo, (v) general characters of indigo and plants relevant in commerce, (vi) indigo of Bengal, Oudh, Madras of India, Java (Indonesia), Egypt, America, Guatemala, Caraque of Guadeloupe and Mexico. Chapter II (pp. 80–119) explains the methods of selection of soil and its composition for the cultivation of *Indigofera*. Chapter III (pp. 120–191) describes the tools useful in the extraction of indigo from dried leaves. The important final chapter refers to another dye-yielding plant of India,

*Wrightia tinctoria* (Apocynaceae) (pp. 192–246), explaining its synonyms, description of the plant, colouring principles in its leaves, extraction of the colouring material and the number of species of *Wrightia* in peninsular India. In the last section, a detailed description of the 'factory', consisting of furnaces and cauldrons, belonging to one Fischer (note 14) that was extracting the dye in Salem at a commercial scale occurs (pp. 205–210).

### Jardin Botanique de Pondichéry

In the near three decades at Pondichéry, Perrottet enriched the garden by introducing several plants that have been shown to bear either economic importance to humans or had the potential of being useful, not only from within the rest of India (e.g. Calcutta, Madras), but from overseas (e.g. Réunion, Sri Lanka) as well.

Because the bark of *Cinchona* (Rubiaceae) to treat malaria was unavailable in India until the late 1860s, William Roxburgh (1751–1815), the Scottish medical doctor–botanist stationed in Madras, searched for substitutes within India. He found *Swietenia febrifuga* (Meliaceae), an Indian native, in Samalkottah in 1793. Roxburgh concluded that the bark of *S. febrifuga* included many principles that do not occur in the bark of *Cinchona*, and water extracts of *S. febrifuga* bark were stable for a longer period of time than those extracted from *Cinchona*<sup>29</sup>. The efficacy of *S. febrifuga* as a substitute for that of *Cinchona* was emphasized later after trials on humans<sup>30</sup>. Because of the established usefulness of *Swietenia febrifuga* (presently, *Soymida febrifuga*, Meliaceae) in treating the fever (malaria), one of Perrottet's early efforts was to bring its seeds from the Shevroy Hills (11°50'N; 78°16'E) and establish them at JBP. On establishing the seedlings of *S. febrifuga* at JBP, Perrottet says (ref. 31, p. viij [viii]):

'[In this garden, *sic*], we have, among others, *Swietenia febrifuga* Roxburgh, which is the largest of all the trees in this region. We have, at the same time, consolidated a sizable herbarium, that includes rare and little known plants, which would enable determining young plants and seeds

of this locality, which we do not know yet accurately' (note 15).

In his articulate introduction (ref. 31, pp. i–ix), Perrottet indicates that much of the improvements he made to JBP, by introducing rare and useful plants, occurred in 1863–1867. Perrottet explains the delay in publishing his catalogue (ref. 31, p. iii–iv):

'Another reason, more assertive probably, which postponed this publication, is the widespread insinuation among the public, suggesting that our garden site was worth nothing, absolutely nothing; the experimental plots were affected by salinity, which is a major fallacy ...' (note 16).

Reading the above saddens, given the enormous effort he made to make JBP vibrant.

Perrottet (1867) has organized the catalogue following de Candolle's plant classification *Prodromus Systematis Naturalis Regni Vegetabilis* (note 17). Close to a 1000 plant species are listed in this catalogue and for detailed annotations on the plants of JBP, the reader is referred to Gupta and Marlange<sup>32</sup>. One key attraction of JBP is the imposing *Khaya senegalensis* (Meliaceae), a native of western Africa, which is claimed by the present managers of JBP as a tree introduced by the French in 1826. Perrottet does not list this taxon in his catalogue, which indicates that *K. senegalensis* did not exist in JBP in 1867 and was introduced there much later in time.

### Conclusion

Perrottet spent nearly three decades in Pondichéry experimenting and establishing several useful and rare plants. Many of them were brought to JBP from different parts of India and a few were from overseas. And he succeeded in growing them. Although botanic gardens existed in Europe<sup>33</sup> and in India<sup>5</sup>, JBP stabilized out of the committed and conscientious effort of Perrottet. His avidity as a collector of economically useful plants and introducing them into France, and thus into the remainder of the Western world, is laudable. Will the Government and people of Pondichéry remember this relentless worker and experimental botanist in a better manner, by restoring JBP to its pristine elegance?

## Notes

1. Perrottet refers to Oupar as a small river (pétite rivière). The website of Institut Français de Pondichéry explains that this aqueduct, known as *Uppar*, was covered with concrete slabs in 1937 and presently functions as a sewer duct.
2. Because I had restricted myself principally to Puducherry, I have not mentioned Victor Jacquemont (1801–1832) in detail. Jacquemont was a remarkable French naturalist, who explored the Western Himalaya in 1828–1832 (ref. 34), a decade and a half earlier than Joseph Dalton Hooker, who explored the Himalaya in 1847–1851 (ref. 35).
3. Pierre Henri Philibert commanded the *Rhône* and *Durance*, which left the island of Aix in 1819. The expedition intended to recruit volunteer Chinese workers at Java and Manila and settle them in French Guyana. A collateral objective was to collect economically useful plants from the Far East and establish them in French colonies, such as Réunion, Guyana, the Antilles and Senegal. This mission introduced water buffalos into French Guyana and snake-eating birds into Martinique. After stopping at Cayenne, La Praya, Réunion, the northwest coast of New Holland (Australia), the Makassar Strait, Celebes, the Philippines, Borneo, Java, and again Réunion, the *Rhône* went to French Guyana to dispatch plants and animals, while the *Durance* went to Rochefort (southwestern France). Perrottet stayed in French Guyana to establish the introduced plants. The *Rhône* returned to Lorient (Brittany, France) in 1921, bringing fishes gathered in India<sup>7</sup>.
4. Jean Baptiste Guillemain of the National Natural History Museum of Paris was the author of *Zephyritis Taitensis*, an early enumeration of the plants of Tahiti. He edited the *Annales des Sciences Naturelles Botanique* from 1834 until his death. Achille Richard (1794–1852) of the University of Paris was a French botanist and physician. He was a professor of botany at the Faculty of Medicine. Besides several books on plants, he will be remembered for his *Monographie des Orchidées des Îles de France et de Bourbon* (J. Tastu, Paris, 83 + 11 pages). He collaborated with Perrottet writing botanical treatises, e.g. the *Flora of Senegambia* (1833). Felix Edouard Guérin-Méneville (1799–1874) was a Parisian entomologist, who studied moths and butterflies (Insecta: Lepidoptera).
5. The first volume of American Silk Grower and Farmer's Manual (1838) includes multiple annotations and references to *M. multicaulis* and rearing *Bombyx mori* on them (pp. 1–6, 200–204), in addition to what I have referred as Bossin's notice (pp. 277–278).
6. 'Celestial Empire' – traditional name for China.
7. Collins (1951) disputes the mass of fruits of *A. comosus* indicated by Perrottet.
8. Presently the Women's Hostel of the C.S.I. College of Engineering, Kétti, The Nilgiris (Rev Philip K. Mulley, Coonoor, The Nilgiris, pers. commun., e-mail, 23 July 2014).
9. Hubert-Jean Victor, le Marquis de Saint-Simon, was the Governor General for the French colonies of India during the Second French Colonial Empire. Saint-Simon held office from May 1835 to April 1840.
10. John Sullivan (1788–1855) was the Collector of Coimbatore, which included the Nilgiris. Sullivan is credited as the 'discoverer' of the Nilgiris. W. Ross King was a British anthropologist at the Nilgiris, studying the sociology of the tribes in that landscape.
11. The Agri-Horticultural Society of Madras started as 'The Madras Horticultural Society' in 1835. One highly active founding member was Robert Wight, a Scottish surgeon in the Madras Medical Service, better remembered for his interest in horticulture and his major botanical publications made in 1840 and 1853. This Society changed to its present name in 1860. This Society and its garden function even today in Madras.
12. One Henry Mann owned coffee plantations in Coorg (12°42'N; 75°74'E) and ran a company 'H Mann & Co' (ref. 36). Possibly Henry Mann started the tea industry in the Nilgiris and because of local political interference he left the Nilgiris to settle in Coorg.
13. Mark Nesbitt remarked that he would read 'A.R. det.' as 'A.R. del.t.'; 'del.t.' representing 'delineavit', implying Achille Richard did the drawings (Nesbitt, pers. commun., e-mail, 31 July 2014).
14. G. F. Fischer purchased a monopoly business of extracting dyes from *Indigofera tinctoria* and *Wrightia tinctoria*, situated in Áttur, Salem District, Madras Presidency from one Heath in 1833. Fischer improved the method of dye extraction from *Indigofera* using lime water (Ca(OH)<sub>2</sub>) and allowing the plant material to ferment in large vats for 24 h, followed by boiling in cauldrons and draining them to separate an indigo paste. This paste was squeezed in a screw press to remove moisture, air-dried into blocks of dye material, sliced and sold. Fischer's enterprise in Salem District flourished until 1894 (ref. 37).
15. Nous citerons, entre autres, le *sweetenia febrifuga* de Roxburg, qui est le plus gros et le plus grand de nous les arbres de ces régions. Nous avons, en même temps, rapporté de la un herbier assez considérable, composé de plantes rares et peu connues; il pourra nous servir à déter-
- miner les jeunes plantes de cette localité venues de grains ici et que nous ne connaissons pas encore exactement.
16. Une autre raison, plus péremptoire peut-être, qui nous eût différer cette publication, est celle relative aux insinuations répandues dans le public, tendant à faire croire que le terrain de notre jardin ne valait rien, absolument rien; qu'on y trouvait çà et là des parcelles où le sel marin dominait (c'est de la plus grande fausseté)....
17. The de Candolle *Prodromus* volumes run from 1824 to 1873, the earlier editions organized by Augustine Pyramus de Candolle and the later editions by Alphonso de Candolle. Perrottet could not have consulted all the 17 volumes of the de Candolle volumes since he died in 1870. Throughout this catalogue, Perrottet refers to 'de Candolle' as 'Decandolle' and 'Dc.' and distinguishes Alphonso de Candolle as 'Dc.' (Alph.).
18. Albert Wilhelm Friedrich Eduard Gockel was born in Baden (Germany) in 1860. He graduated in physics from the University of Heidelberg in 1885. After a short stint as a high-school teacher in Germany, he joined as an assistant to Joseph von Kowalski at the University of Fribourg, Switzerland in 1901. He became a full professor of physics in 1909 and contributed to the physics of the atmosphere and the earth. He died in Fribourg in 1927 (ref. 38, p. 158).

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