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Nonpathogenic theileria of Indian cattle and buffalo

I have pointed out[1] that the usually nonpathogenic theileria of Indian cattle was commonly, but mistakenly named as *Theileria mutans* because this parasite did not occur outside Africa. This paper was followed by a critical review of mostly nonpathogenic theilerias of cattle described in the literature[2]. I assigned the parasite of Indian cattle and buffalo, provisionally, to 'buffeli/orientalis' group. This paper has been commented upon by Uilenberg[3]. The comments, being relevant and apt, are reproduced below.

(GU: Unless it can be convincingly demonstrated that there are also specific parasites which only infect buffalo, and that differences in virulence and those found with molecular methods are species-specific and not strain-specific, the name *T. buffeli* Neveu-Lemaire, 112 appears to have priority.)

The view of Uilenberg that the proper taxon for mostly nonpathogenic thieleria of Indian cattle and buffalo is *Therleria buffeli* is correct.

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A need for online herbaria in India

Herbaria represent fundamental documentation of the diversity of plants. The process of documentation through herbarium involves drying and preservation of plant specimens on paper sheets of a standard dimension bearing information. Collection of herbarium specimens results in voluminous repository, 'Herbarium' which is accessible to a wide spectrum of naturalists. Floristic workers, taxonomists, ecologists, etc. consult herbaria from time to time in order to study the diversity and distribution of species. Recently, herbaria are also being consulted by the biochemists, pharmacological workers, molecular biologists, etc. for authentication of species.

India harbours a rich diversity of plants. The enormous wealth of our plant resource can be judged from the recent estimates of flowering plants alone, which are about 17,000 species[1]. Specimens representing the diversity of plants are stored in our National, State and District level herbaria spread across the country. These include several type specimens, specimens of RET species. There are about 48 recognized herbaria in India, which store more than 3.5 million specimens[2]. These include herbaria maintained by various circles of Botanical Survey of India (BSI), research institutes, several universities and colleges.

Considering the dimension of the nation, it becomes practically very difficult for researchers to visit each and every herbarium in each part of our country. Technological advances, in the recent years, have potential to circumvent this problem through digitization of herbaria, which involves the process of gathering data and images of specimens and storing them in a digital format. By computerization, these vast collections can be accessed and analysed at a glance in various ways which was not possible previously. The 'image herbaria', however, are not intended to replace the actual collection and in-depth study of specimens.

In many developed countries, herbaria are now available online. Virtual Herbarium of Chicago University[3] and Australia's Virtual Herbarium[4] are examples. Such efforts are lacking in the Indian context. Internet facilities have succeeded in reaching even remote places, and information technologies have emerged as viable media to disseminate and share knowledge. Having a knowledge base of herbaria in India with a catalogue of the species made available online would bring convenience to researchers in our country.

One of the pioneering works in this direction has been the digitization effort called *Sampada* initiated by the Indian Biodiversity Information Network (IBIN) of the National Chemical Laboratory, Pune. IBIN has provided a freely downloadable package known as *Sampada* to all the natural history collection curators[5] in order to form an online repository of herbarium and other natural history collections. The online databases like Medicinal Plant Board Database[6], Foundation for Revitalization of Local Health Traditions (FRLHT) database[7], Indian Biodiversity Information Database[8] are a few more such efforts.

The Agharkar herbarium (AHMA) of Agharkar Research Institute, an internationally recognized herbarium, has been the first herbarium in India to have a dedicated website[9], allowing anyone to access the herbarium database. The website was launched during the Symposium of the Indian Association of Angiosperm Taxonomy by Ganeshaiah in 2006. A certain set of herbarium information was made available online for the duration of one year. More than 2500 visitors browsed through the information. In future, the Agharkar Research Institute plans to further upgrade the information and enrich it by incorporating suggestions and feedback of viewers and making appropriate modifications. The institute also plans to make the basic package of herbarium available to other small herbaria like research institutes, universities and colleges. This will help herbaria grow in strength, initiate networks for digitization and allow for a lot of collaborative interactions. The Botanical Survey of India has also initiated digitizing the type specimens housed at Central National Herbarium (CNH).

If such initiatives are taken up by institutes, Universities and national nodal agencies like BSI and NBRI, this will slowly and surely result in building the entire herbarium online. The potentials of such a networked database are immense and will address many practical difficulties faced by researchers in the field of plant taxonomy· The online available herbarium together with online databases[6–8] will help in putting in front, a comprehensive picture of the Indian floral biota. A small step towards building sustainable mechanisms would contribute to a rich knowledge base for generations to come!

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Advance and retreat of Chaurabari glacier

The following observations related to the communication by Chaujar[1] may be relevant.

It has been said '. . . that the temple remained submerged in ice/glacier for a minimum of 400 years. . . '. The contention that the man-made temple complex remained intact, even after remaining buried for 400 years, under a cover of around 500 m of moving ice mass at the time of 'Little Ice age' appears unlikely. Further, the thought of the passage of the glacial ice through the temple complex and creating striations on the inner and outer walls is improbable. Any such man-made civic structure cannot even remain intact under an impact in a 500 m column of flowing water, let alone moving glacial ice. A glacier has tremendous energy and force to erode the adjoining rock walls of the valley; it not only modifies the earlier V-shaped valley into a broad U-shaped one but also deepens and straightens it[2,3].

Although it has correctly been mentioned that '. . . Temple is made up of thick granites and high grade metamorphic gneissic rock slabs', the foliation planes made up of alternate dark (M, Mica domains) and light coloured (Q-F, quartz-feldspar) bands have been misidentified as 'Striation' markings (figure 8 *a*, *b*) on the outer as well as inner walls of the temple. The surface across the foliation planes gets rough due to differential weathering processes. Figure 8 *b* clearly shows the presence of an elongated augen of quartz and feldspar. Good photographs of glacially sculptured striations are available in the literature[2–4].

Assigning lower height of 3160 m to L1 and higher height of 3640 m to L4 needs clarification.

There seems to be an unnecessary mix-up of a number of mythological beliefs like the construction of existing Kedarnath temple by Pandavas, debating the date of *Mahabharata*, submergence of Dwarka, etc. with purely scientific information. There are well-established scientific norms in archaeology to determine the age of temples. Although the Kedarnath temple shows a fine specimen of Katyuri architecture of early medieval period, nothing can be said about the date of construction of the temple with certainty[5]. Even the famous Badrinath temple in the adjoining Alaknanda valley, believed to have been established by Shankaracharya (788–820 AD), cannot be related to that period and seems not older than the 17th century[6]. Thus simply considering '. . . a minimum age of about 3000 years. . .' for the present Kedarnath temple complex based on mythological beliefs is unwarranted.

Agreeing to the fact that the temple (or any civil construction) cannot withstand the enormous stresses exerted by a column of 500 m moving ice during glacial advancement, it is suggested that it is essential to reassess the time of glacial advances and retreat, believed to have taken place during Little Ice age. Either the present temple complex was constructed after the glacial advance or the morainic ridges are pre-temple constructions. In case of the latter situation, the palaeogeographic reconstruction of Chaurabari glacier in time and space needs critical reassessment.

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