CORRESPONDENCE

Science and Current Science on cultivating ‘uncultivable’ bacteria

Kaeberlein et al. have recently published a paper which claims to have developed a method for culturing ‘uncultivable’ bacteria. The publication of this paper in a journal of such a high reputation is surprising, because what the paper reports is neither new nor substantiated. Readers might recall that a paper on a method for culturing the previously uncultured bacteria was published in Current Science two years ago. There are a number of problems with the paper by Kaeberlein et al. We do not have a definition for the term ‘uncultivable’, and therefore a claim of having cultured them suffers from inherent problems. These bacteria do not resist cultivation as an inherent property; it is just that we did not know how to grow them. The authors’ concept of culturing by simulating the natural habitat of the microorganisms is logical, but not new. Researchers in the 1940s and 70s followed this approach, made similar observations, and succeeded in isolating hundreds of diverse organisms in pure cultures. Due to the non-availability of molecular methods, the taxonomic status of these isolates remained unclear. Nevertheless, researchers could get a colony count, two orders of magnitude greater than conventional plate counts, as claimed by Kaeberlein et al.

Waite et al. revived and modified the earlier line of work and isolated 90 microorganisms in pure culture. Eleven of these isolates were ribotyped, and they showed the near sequence matches in the range of 33–76%, indicating their novelty. The paper also studied the physiology and energetics of these isolates and made some important observations.

In comparison, the claim by Kaeberlein et al. is poorly backed by data. They could successfully isolate two microorganisms in pure culture, MSC1 and MSC2, which show a sequence similarity of 93% and >96% respectively, to known well-studied organisms. It is amazing that the authors, with just two isolates that have such a high sequence similarity to cultured organisms, could claim to have developed a strategy for isolating uncultured organisms and publish their claim in Science.

Kaeberlein et al. have hypothesized a role of cell-cell signalling in the growth of these organisms. This concept is not new. The role of signalling molecules in the transition from non-culturable to culturable state has not only been suspected but at least one such molecule has been isolated and characterized. Kaeberlein et al. seem to be completely oblivious of research outside their laboratory.

Nevertheless, there is an importance attached to this paper. After microbiologists the world over rediscovered that 99% or so of the bacterial diversity remains unstudied, there has been an overwhelming belief about their ‘uncultivability’. A large number of groups have been attempting to gain access to this diversity through culture-independent molecular methods. Publication of a report in Science, of having cultured some of them, can help in the revival of the classical microbiology approach, which is economical as well as efficient.

The episode also reflects on publishing. Current Science publications are not listed in PubMed and other sources popularly used by researchers. This can be an easy escape for not having referred to Current Science papers. Current Science may take pride in publishing an important issue two years before Science. However, if its publications remain largely unnoticed globally, it would have a limited value.


Subhash S. Kulkarni
Department of Microbiology,
Abasheb Garware College,
Karve Road,
Pune 411 004, India
e-mail: subhash_kulkarni@hotmail.com

Pedicularis (Scrophulariaceae) – an underinvestigated genus of botanically curious plants

The genus Pedicularis, described by Linnaeus in 1737 (ref. 1), commonly known as lousewort, occurs throughout the alpine zones of the world and is represented by about 600 species, of which about 100 find their place in the alpine Himalayan belt of India and only two are confined to South India. Pedicularis bifida (Buch.-Ham. ex D. Don) Pennell is the most common Indian species (Figure 1), extending throughout the Himalayas from Kashmir to Sikkim. The name Pedicularis finds its origin from Latin ‘pediculus’ which means louse, as its decoction was used against lice on domestic animals in some areas of central Europe. They are mostly annual with perennial rootstocks and are hemi-parasites with short, sparsely branched roots, however, the degree of parasitism varies within the genus. The flowers are primarily pollinated by bumble-bees.
Moreover, each complex contains varied morphoforms exhibiting diversity in calyx, corolla, bract, stamen and leaf types. The flowers are seen to possess galea with an outcurved long beak to an incurved short beak; calyx 2–5 lobed with outcurved ciliated dentate margin to a straight, a-dentate margin without cilia; colour of corolla varies from yellow to purple (P. hoffmeisteri Klotzsch ex Klotzsch & Garcke) and habit with small, densely-tufted to tall, stout herbs (tribe Siphonantheae). In our opinion, colour of the corolla does not appear to be of a reliable and stable character. This view is in support of Hooker\(^2\) and Prain\(^6\), as they also treated *P. megalantha* D. Don to be geographically diverse in colour.

Such enormous variations occurring within these complexes probably result from the amalgamation of both primitive and advanced characters as possessed by the genus, coupled with ecological factors, posing a challenge for taxonomists. Further, the characters within the group are so overlapping that they have often been a lure to taxonomists for segregation or merging and then re-segregating them at infra-specific levels, creating a lot of confusion. Taxonomists are therefore striving in the quest of providing the taxa their comfortable rank within the limits of botanical classification, but the genus continues to enjoy the privilege of being the most curious botanical entity.

Considering the quantum of variations, our system of botanical classification based on measuring and counting the morphological features of diagnostic importance, such as habit, root, leaves, stem, bracts and flowers, appears too narrow to encase the complex variable taxa of *Pedicularis*. This problem is amplified as the tender flowers lose their form and colour when dried. Herbarium specimens therefore, pose many difficulties while determining the species morphology. Further, since the plants are distributed in the icy-cold, alpine terrains of the Himalayas, and the different species bloom at different times, extensive and regular field surveys are extremely difficult but necessary for accuracy. It may rightly be emphasized here that techniques such as chemotaxonomy and DNA fingerprinting, if incorporated in basic taxonomy, will certainly prove to be of great utility in filling up the lacuna. We therefore, urge upon the molecular biologists to join hands with taxonomists while solving such intricate problems of taxonomy.

---


ACKNOWLEDGEMENTS. We thank Dr P. Pushpangadan, Director, National Botanical Research Institute, Lucknow, for encouragement and DST, New Delhi for financial assistance.

ARTI GARG
TARIQ HUSAIN*

*For correspondence e-mail: husar_2000@yahoo.co.uk

---

Figure 1. *Pedicularis bifida* (Buch.-Ham. ex D. Don) Pennell in its natural habitat.