happened. Thus, it is axiomatic that the report published[1] has factual errors and has unscientifically implicated MAPS using erroneous results[2]. The results of the present study clearly show that discharge from the MAPS condenser does not contain elevated levels of Cu. It not only gives credence to the comment by Kureishy[2], but also parleys with him.

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A comment on Gula and Gulate megaspores

Heterospory – a necessary step in the evolution of seed habit in vascular land plants, is the production of two kinds of spores, viz. micro and megaspores. Megaspores are the female gametophytes producing reproductive units of heterosporous plants. In fossil conditions where the nature of the gametophytes produced by the spores is not known, the two kinds of spores are differentiated on the basis of their respective sizes. Generally, spores larger than 200 µm are considered as megaspores[1].

Dispersed megaspores are classified as Azonate, Zonate and Gulate/Lageniculate by various workers[2–4]. In the Azonate group megaspores have uniformly distributed surface ornamentations, whereas in the Zonate group the exoexine extends to form a thin zona all round the body and the dense ornamentation is found between the contact area and the zona. The third group – Gulate/Lageniculate – includes megaspores with gula. In these megaspores, the triradiate contact area extends apically to form a cone/tube/neck-like structure, which is invariably devoid of ornamentation.

Though Lageniculate megaspores were first reported by Bennie and Kidston[5], the term 'gula' was introduced by Potonié and Kremp[2] when they proposed Unterabteilung Lagenotriletes – a new subturma under abteilung Triletes[6]. The spores included in this group are trilete, 'Der apex exrhebt sich meist auf einer 'Gula', das heißt auf einem Hals (=höherem Deheszenzkegel)'. The term 'Gula' was described as 'Wenn die tecta (namentlich im näheren Bereich des apex) sehr hoch werden, entsteht ein Dehiszenzkegel, der als Gula, be zeichnet wird. Man vergleiche die Diagnose der 2. Unterabteilung Lagenotriletes, zu denen die Gattung Lagenicula gehört'[7], meaning thereby that gula is a neck-like projection/outgrowth in the apical region of the megaspore. Bharadwaj[8] instituted a new series Gulati for 'the trilete spores with a dehiscence cone in which the tecta more or less in the neighbourhood of the apex, are vertically raised forming a 'vestibule'[9] (pp. 27–28) or 'gula'[7] (p. 12)'. Thus, this structure has been variously termed/described as 'vestibule'[9], cone-shaped neck-like projection which projects out from the body of spore[10] (p. 10), and 'apical prominence'[11]. Zerndt[12] used the name *Lagenicula* as a genus for dispersed megaspores with gula. At present, nine Gulate/Lageniculate genera are known from Devonian[13], Carboniferous[14–18], Permian[3,4,19–24] and Triassic[25]. From Indian Gondwana, five Lageniculate genera are described, viz. *Lagenicula* (Bennie & Kidston) Potonié & Kremp 1954 (refs 3, 4, 24, 25), *Satpuraspora*[23], *Maithyspora*[22], *Dizkstraea*[22] and *Setosisporites*[24].

Chaloner[11] described some megaspores in fertile fructifications of two Carboniferous lycopods – *Lepidostrobus monospora* and *Lepidostrobus dubius*, i.e. *in situ* megaspores and placed them under the genus *Triletes horridus*. According to him, 'The sporophylls of these cones composed of a proximal horizontal sporangium-bearing portion and a distal sporophyll lamina. The abaxial half of the sporangium is occupied by one fertile and three abortive megaspores'. Further, description of the fertile megaspores by Chaloner[11] includes 'apex (abaxial pole) of the spore bearing a prominence, which

obscures the triradiate ridge. Spores covered, except for this apical prominence, with small spines'. He described gula as 'apical prominence' which 'although not always as elongated as in the type figures of *Triletes crassiaculeatus*[26] (p. 9, figure 28) is considerably larger in the fully developed spores of *Lepidostrobus allantonensis* than *L. dubius*'. This apical prominence is actually the germ tube, hence, it is not always of the same size as it depends on the degree of germination. It is possible that these megaspores found in fertile fructification of *L. monospora* and *L. dubius* might have germinated prior to their liberation from the sporangium – a rare and evolutionarily important phenomenon leading to the development of further advance stage, i.e. retention of megaspore in the megasporangium.

The nature of gula is not known[4]. This is not produced in any living heterosporous plants, although it can be compared with germinated megaspores. In our view 'gula' is a germ tube which emerges from the spore by rupturing the spore coat or the sexine for germination as is evident from the photographs and text-figures of gulate megaspores described by us[24] and various workers[27–29]. At the time when germination was taking place, these megaspores were preserved and fossilized. This view is strengthened by the fact that gula is always without ornamentation, is not always of the same length, and never produced in living plants because there it is designated as germ tube.

For evolving a simpler, logical and practical system of identification and classification based on the above points and major qualitative characters of megaspore organization and exinal characters, it is now necessary to reorganize and reclassify the megaspore genera described so far. In view of the above points, the group Lagenotriletes should be abolished and lageniculate/gulate megaspore taxa recorded so far should be merged in already described megaspore taxa only on the basis of exosporium and mesosporium characters, neglecting the presence or absence of the germ tube or gula, since the gula is nothing but a germ tube and gulate megaspores are germinated megaspores.

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Hot springs of Tawang and West Kameng districts of Arunachal Pradesh

The discovery of extreme environments has made more plausible search for life outside the earth, and even the possibility of panspermia (transport of life from one planet to other). The Eastern Himalayas are among one of the twenty-five biodiversity hotspots[1] identified worldwide in the biosphere as an area of great biological diversity and as one of the globally important ecoregions out of the two hundred regions which have been identified worldwide[2]. Arunachal Pradesh, with its climatic conditions, altitudinal variations and by its geographical position, occupies a major portion of eastern Himalayas and is a vast repository of resources of both ecological and economic importance and is a biodiversity-rich region in northeastern India. Arunachal Pradesh (83,789 km^2) highly endowed with diverse ecosystem lies in the confluence zone of Indo-Chinese,