Animal dissection: to be or not to be?

On 5 August 2014, the University Grants Commission (UGC) issued a notification regarding animal dissection in undergraduate (UG), postgraduate (PG) and research programmes, which came in force with immediate effect. According to this notification, animal dissection/ experimentation is no longer in the curriculum of zoology or allied subjects. The usage of animals in research should be minimized less and animals should be procured only from breeders approved by the Committee for the Purpose of Care and Supervision of Experimental Animals (CPCSEA). However, this notification does not provide answers to the following questions raised by students, experts and teachers of zoology.

(i) Generally, in most universities throughout India, fishes, insects, crustaceans and annelids dissected used to understand their morphology and anatomy. According to the notification, around 1 million students require animals for dissection studies. If one student requires minimum 3 fishes, then 1 million students will require 3 million fishes for dissection. However, if we assume that people consume a minimum of 10 fishes per year, then the population of fish-eaters is more than zoology students in the country. Then why is it assumed that only dissection is depleting fish diversity? By the same rule, why not ban fishing as well?

(ii) Indian farmers use chemical pesticides for insect pest management and we also use repellents to kill mosquitoes and cockroaches in our homes. If we use these insect pests like grasshoppers, cockroaches, mosquitoes for dissection, how it is lethal to biodiversity? If we are going to prevent dissection, then why not prohibit companies from manufacturing pesticides. A fertilizer used in agriculture enters into the aquatic ecosystem and kills the flora and fauna. In this case, how do we protect the biodiversity of the aquatic ecosystem?

(iii) Some species like *Labeo rohita*, *Catla catla*, prawn, honey bee, silk worm, crab, earthworm, *Pila*, etc. can be easily cultured in the laboratory. If we use these for dissection, how will it affect biodiversity? And if so, what about aquaculture?

(iv) We scarify many more animals for desirable products or use them as food. Is it ethical?

(v) If animal ethics is important, then why do we consume chicken, goat, pig, etc.

(vi) One can understand the animal systems using animated models. It will be simply informative for students. But what about hands-on training and curiosity of the students? The use of cell culture is an alternative, but it is like studying the behaviour of a tiger in the zoo.

(vii) If we are going to prevent the use of animals at UG and PG levels, what about research level programmes. It will be like sending an army for war without training them on the handling of guns.

Animal dissection or experimentation is the soul of zoology curriculum. It is not possible to identify many animal species without dissection. We suggest that UGC should make some amendments in the notification to continue the same. Here are some suggestions: (i) Dissect only those animals which can be easily cultured in the lab or on field. UGC can make a checklist of these animals; domestic or agricultural pests can also be considered in the list. (ii) We can use the same animals to understand different systems under the direction of Dissection Monitoring Committee (DMC) of the institute. For example, one fish specimen can be used to understand the digestive, reproductive, excretory and nervous systems, and also for the mounting of scales. The number can also be reduced by introducing dissections for final-year students of UG and PG courses only.

UGC must consider the above-mentioned points before banning animal dissection from the curriculum.

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Popularization of *Manilkara hexandra* (Khirni) – an endangered underutilized fruit tree for conservation and utilization

Manilkara hexandra (Roxb.) Dubard (milk tree) is believed to have originated in India[1]. It is an important underutilized fruit tree species (family Sapotaceae) commonly distributed in tropical deciduous forests of western and central India. It is locally known as 'Khirni', 'Rayan' and 'Raina' among the tribal populations of Rajasthan, Gujarat, Madhya Pradesh and Maharashtra. Bark, fresh fruits and seeds of Khirni have high economic value due to their nutritional and medicinal applications. Mature fresh fruits are sweet and can be consumed raw as well as after drying[2,3]. Fruit is a good source of minerals (calcium 83 mg, phosphorus 17 mg, iron 0.92 mg), sugars, protein (0.48 g) carbohydrates and vitamins A and C (673 and 15.67 IU). Fresh or dried fruits are consumed by local inhabitants/ tribal people[2,3]. Fruit is a source of vitamin A for the nutritionally deficient tribal women and children. This commercially and economically important tree provides livelihood security to tribal populations. Local people sell this fruit at Rs 30–40/kg. Traditionally, it is used in medicinal herbal drugs to cure various diseases such as jaundice, fever and a wide range of gastrointestinal disorders. Its bark and fruits are also used for medicinal purposes like treatment of ulcers, dyspepsia, opacity of the cornea, bronchitis, urethrorrhea, leprosy, etc.[4–8]. The seeds contain approximately 25% oil (emollient and demulcent), which is used for cooking purposes[9]. The bark also contains 10% tannin, used in the treatment of fever and for tanning purposes[4].

The wood of this tree is very hard, tough and durable and is used for oil presses, house building and turnery.

As there is no organized cultivation and land is being cleared for agriculture, there is severe pressure on natural wild populations of Khirni for its fruit by the tribal people. As a result, the species falls under the 'critically endangered' category (extremely high risk of extinction in the wild)[10]. Presently, few natural populations are found in Ratlam, Chanderi, Jhabua and Neemach in Madhya Pradesh, Panchmahal and Bharuch in Gujarat, and Sirohi in Rajasthan. Moreover, this tree has received attention as commercial rootstock for sapota plants. A survey conducted by Malik *et al.*[3] in the diversity-rich areas of Madhya Pradesh, Rajasthan and Gujarat revealed substantial variability in all Khirni germplasm accessions. The fruit length ranged from 0.85 to 2.50 cm with an average of 1.78 cm and width ranging from 0.62 to 2.90 cm with an average of 1.55 cm. The fruit weight varied from 0.74 g to 4.13 g with an average of 1.51 g. Significantly, maximum coefficient of variation (CV) was observed in pulp weight (46.62%) followed by fruit width (44.51%) and fruit weight (43.71%). Genetic variability studies among 23 accessions of Khirni using random amplified polymorphic DNA (RAPD) markers have shown 78% polymorphism revealing substantial genetic diversity within this species[11].

Ex-conservation efforts have been taken at Cryogene Bank, NBPGR, New Delhi for 60 accessions of Khirni germplasm. However, *in situ* or complementary conservation efforts are lacking. Some of the germplasm collections are also maintained at CHES (CIAH), Godhra and CISH, Lucknow. Conservation of this species in natural habitat is the need of the hour, which can be further utilized for harnessing the potential of the species for its fruit and for medicinal properties. The main drawback with regard to this species is that natural regeneration is poor due to fruit collection from natural populations. It also shows non-orthodox seed storage behaviour and hence cannot survive for long periods. So both these issues must be considered during multiplication of this species among farmers/tribal communities. Above all, popularization of this species is required to generate awareness for its cultivation and conservation, as it is important for tribal populations and for ecosystem diversity. The present study aims to open up research areas for assessing the range of variability among natural populations and conduct improvement studies in the field to cull out elite cultivars for popularizing among farmers/tribals for conservation and sustainable utilization. This will prevent the species from becoming extinct.

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Eclipta prostrata (L.) L. (Asteraceae) – an eco-friendly natural hair dye

The common weed *Eclipta prostrata* (L.) L. (family Asteraceae) is a prostrate or reclining to erect, often branched, annual or perennial herb. It is used for various medicinal purposes like urinary infections, gastrointestinal disorders, jaundice, cough and lung infections. Several health benefits and antivenom properties of this plant have been reported[1–6].

In Purba Medinipur, West Bengal, India the rural people commonly use the leaf extract of this plant as a natural dye to colour their hair. The juice of the herb contains an oil-soluble black dye. The bhringraj (vernacular name of *E. prostrata*) leaf powder is mixed with coconut

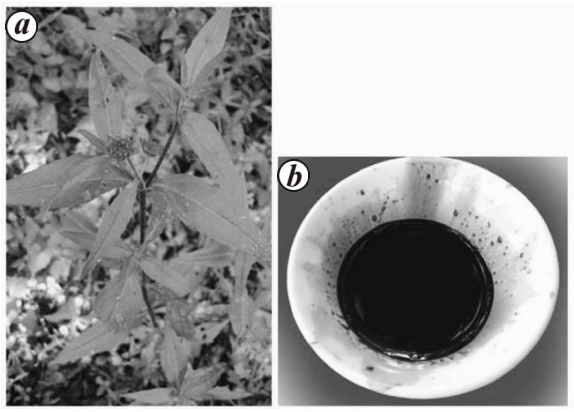

Figure 1. ***a***, *Eclipta prostrata* (L.) L. in its natural habitat. ***b***, Dark greenish-black leaf extract of *E. prostrata*.