Tools for image cropping or change of contrast to enhance clarity of the desired area of interest, or to minimize occurrence of artefacts are considered acceptable, but extensive image manipulations intended for scientific misinterpretation are unacceptable and often lead to research misconduct[1].

Submission of fraudulent digital images has been reported in leading scientific journals, including a high-profile German case which was brought to light in 1997 (ref. 2). The 'publish or perish' scenario has further caused an alarm among the scientific community, and needs to be condemned[3].

This highlights an urgent need for establishing universal code of ethics for acceptable image manipulations, that can be subsequently altered for application to different branches of science. A remarkable effort in this regard has already been made by Cromey[2]. He has a background in biological microscopy, but has emphasized image-editing guidelines with broad application to scientific images of all types. These could be further modified to suit the specifications of different scientific societies and should be strictly applied by the editorial boards of various journals as well as certification boards.

We believe that a few small steps at the individual level can alleviate this menace of image fraudulence. First and foremost, a mandatory ethics class for undergraduates and researchers should be conducted. The students must be made to understand the reasoning behind the detailed instructions for authors for manuscript submission, so that they will willingly adhere to them. Workshops need to be conducted for prevention of photo forgery, where students can be taught water-marking of images or attachment of meta-data[4]. Also, the guides/mentors should be more watchful of the digitized data submitted in their name, that may curb some intentional falsification by students who are more adept at using image-editing software.

Some strategies can also be adopted at the governance level. All journals or certification boards should have specialized software for identification of intentionally falsified images to check image forgery. Even at institutional level, internal research committees that have access to these software can be formulated to monitor each manuscript before submission. Close scrutiny of digital images by zooming and recognition of any discontinuities or unexplained deviations from the normal may be the simplest way of reporting image fraudulence. Strict policies should be formulated for such scientific misconduct and researchers with repeated complaints should be reprimanded. Such manuscripts should be immediately withdrawn and the authors should be banned for a specified duration from publishing further.

Digital images are considered as the exact representation of the original research and are retained in the memory of the readers for a long time. Hence, their authentication is imperative. It is the primary responsibility of researches to present their work in original. Scientific transgression in order of its dilution, fabrication or beautification should be discouraged in order to maintain the sanctity of scientific endeavours.

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A logo for sciences

Many institutions and organizations have their representative identification symbols or designs called logos. Nations and governments characterize their logos with some fundamental principles or mottoes, e.g. 'satyameva jayathe'. Universities and academies showcase their publications, websites, etc. with eye-catching logos. Science and scientists need a logo depicting the most fundamental branches of science, showing their interrelationships. In Figure 1, all fundamental branches of science, viz. atomic physics, mathematics, genetics and biology, psychology and cosmology are represented in a logo.

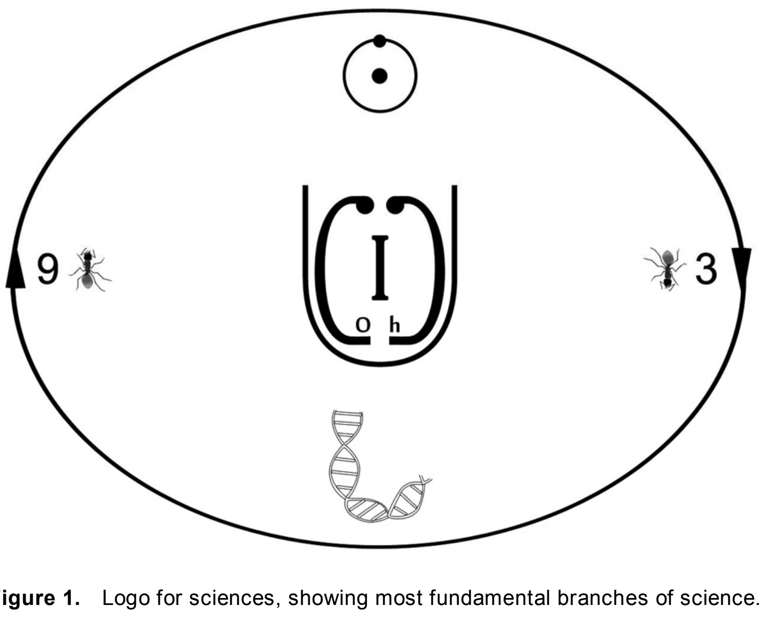

Figure 1. Logo for sciences, showing most fundamental branches of science.

Atom (of hydrogen) – Hydrogen is the most abundant element in the universe and is formed by one positively charged proton and one negatively charged electron. This can be considered as the building block of the cosmos. This element of the logo represents physics and chemistry.

3 and 9 – Two numbers out of 10. These represent arithmetic and mathematics. These 10 symbols can quantify different things from nil to anything thinkable or imaginable, e.g. trillion raised to the power of trillion – $(10^{12})^{\text{trillion}}$.

Genes – These are building plans (or intelligence) in biochemical forms for all living organisms from unicellular bacteria to worms and humans.

Ants – Ants moving clockwise and anticlockwise at different places and times (conceptually). They do not see each other and do not communicate by any means. But they are united since they fit into a scheme of things in a supervisor's mind or model. Similarly humans, to be precise, natives, living in different continents and time zones. They communicate within their groups only in different languages and are not in any contact. Still they fit into a scheme of global process, biologically and philosophically.

I – This symbolizes intellect, intelligence and instincts in three different mental types, viz. intellectuals, ordinary persons and animals, including foresters. Intellect is neuronally structured in the brain by long-term learnings and practices. Intelligence is what is expressed out in meaningful communications. Instincts are a product of 'mind-is-matter/body' state of life and growth, viz. native animals.

Co – This symbolizes the cosmos – all formed and/or organized matter (e.g. atoms, cells, stars) and energies of the universe.

hↃ – This symbolizes chaos – all unformed, unorganized particles, plasma, energies and unknown things.

U – This symbolizes the universe; not known or conceived fully, but by cosmos and chaos together. The central part of the logo consisting of intellect, cosmos, chaos and the universe can be considered as a seal of the universe.

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Nobel Prize for artemisinin research: Indian side of the story

The Nobel Prize for Physiology or Medicine 2015 awarded to Youyou Tu is heartening to all the researchers around the globe who have been involved in the application of traditional systems of medicine for developing modern methods of therapy. Particularly, it is a matter of joy and satisfaction for artemisinin researchers across the globe, including those in India. The main reason for this highest scientific recognition to Tu and her outstanding work stems from the success of *Artemisia annua* extracts, artemisinin and its derivatives in saving the life of millions in Asia and Africa.

Realizing the enormous anti-malarial potential of sesquiterpene lactone compound (artemisinin) in the early eighties, Nitya Anand (the then Director of CSIR-CDRI, Lucknow) brought seeds of *A. annua* to India. Akhtar Husain (the then Director CSIR-CIMAP, Lucknow) and his team were successful in growing *A. annua* at the experimental farm of CIMAP in Kashmir[1]. The plant was soon acclimatized for cultivation at the experimental farm of CSIR-CIMAP, Lucknow, and later in the plains of Uttar Pradesh. Since the available variety of *A. annua* had very low artemisinin content (less than 0.1%), an intensive breeding programme was launched at CSIR-CIMAP to increase the artemisinin content up to 0.8–1.0%.

Due to technological interventions of CSIR-CIMAP, including development and popularization of artemisinin-rich plant varieties, and improved processing technologies (27 patents, including 14 in the US), the cost of production of artemisinin was brought down from about Rs 40,000/kg to about Rs 10,000/kg. Optimization of the processes for extraction and purification of artemisinin at CSIR-CIMAP led to the production of kilogram quantities of artemisinin for its chemical transformation to more soluble and stable derivatives (Figure 1). While scientists at WHO focused on β-artemether, those at CSIR-CDRI and CSIR-CIMAP teamed together to initiate work on α,β-arteether[2]. Extensive pharmacological investigations and clinical trials on α,β-arteether at CSIR-CDRI eventually led to its development as a drug for the treatment of severe falciparum malaria. These dedicated attempts then led to a series of patents (27, including 14 US patents) and eventually the technology for the production and distribution of indigenously developed anti-malarial drug α,β-arteether was transferred to M/s Themis Medicare, Mumbai and distributed as 'E-mal'. In 2007, α,β-arteether was included in the National Drug Policy for the control of malaria by the Ministry of Health and Family Welfare, Government of India.

The technology package for cultivation of improved varieties of *A. annua* developed by CSIR-CIMAP was licensed to several pharma companies to link farmers for assured price cultivation of *Artemisia* in a public-private-partnership (PPP) mode, not only to enhance industrial productivity and business, but also to enhance rural incomes. Later, M/s IPCA Laboratory, Ratlam entered into consultancy agreement with CSIR-CIMAP, and introduced contract farming of the 'CIMAP-Arogya' variety of *A. annua* covering about 2700 acres of land in Uttar Pradesh, Uttarakhand, Gujarat and Madhya Pradesh by 2012–13. It was demonstrated that cultivation of *A. annua* provides a high return (Rs 65,000 per hectare) to the farmers in a short span of about four months[3]. As a consequence of this synergy among the scientific teams

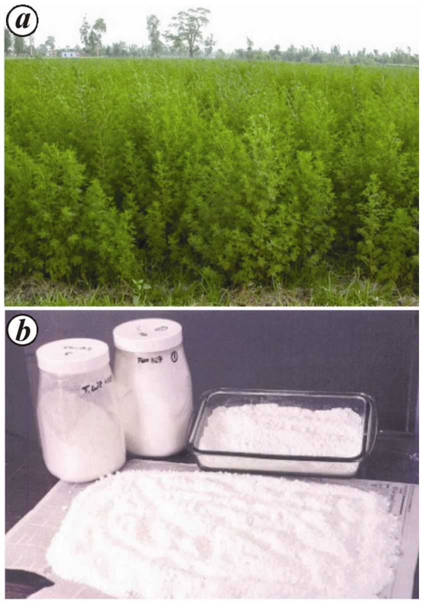

Figure 1. ***a***, *Artemisia annua* (field view). ***b***, Artemisinin isolated at the CSIR-CIMAP pilot plant in Lucknow.