

In this issue

The unyielding hook of heroin

'SHE is hooked on heroin,' they say. The verb 'hook' conveys so much more meaning than the verb 'addicted'. One can imagine how a heroin addict, no different from a baited flailing fish, almost has no escape. *Almost.*

Over the years, several heroin addiction treatment strategies have been developed to 'unhook' addicts. Although these strategies boast of high success rates, in some cases the urge of addiction is simply too intractable. *The hook has pierced too deep.* To reign in such thirstful heroin yearning, Chinese surgeons, under the aegis of the government, practice a controversial treatment strategy – one that has drawn worldwide opprobrium. *Why controversial?* Because it entails the burning off of certain sections in the addict's brain. Verily, the surgeon first drills holes into the addict's skull, and then plunges electrodes deep into her brain. The target of the electrodes: The nucleus accumbens. Once moused into position, the electrodes surge with electricity and ablate certain regions of the nucleus accumbens.

The rationale behind the surgery is straightforward. When the addict ingests heroin, neurotransmitters – dopamine, for example – flood the nucleus accumbens, owing to which the addict *suffers* a most blissful high. After a few hours, however, the effects of the drug fade; the addict craves for the same high again; and thus she ingests heroin once again. And again. And again. *The hook sinks deeper and deeper into the addict with each high,* hence the addiction. The nucleus accumbens, also known as the 'pleasure centre' of the brain, therefore, is integral to the addict's experiencing the high. But by ablating parts of the nucleus accumbens, the drug's hold on the addict is greatly weakened.

The surgery may appear to be most radical to the reader. But in a country like China – where even a small-time drug peddler is sentenced to death – such a treatment could give many another shot at life. Sadly, however, only about half of those operated upon go on to live drug free lives, the other half relapse and fall prey to addiction once again. Worse still, the surgery costs a lot more – upwards of US\$ 5,000 – than what the average Chinese can afford, and, whether freed of

the addiction or not, there exists a possibility that the patient would suffer serious side effects of the surgery. Indeed, the recidivists seem to have drawn the weakest of hands.

To curb heroin recidivism, the following question, therefore, is most pertinent: What factors coax the addict – one with an ablated nucleus accumbens – to succumb to her heroin yearnings once again? Turn to Research Communication, **page 779**, for the answer.

ARIES

TRACE gases and aerosols, released into the atmosphere mainly by anthropogenic activities, are influencing climatic changes around the world. These emissions are also deleterious to human health. In the Indian context, particularly in the atmosphere just above the North Indian plains, studies have established that these emissions are being spewed out at an alarmingly increasing rate. Surprisingly, however, few, if any, studies have quantified the levels of trace gases and aerosols – especially in the lower atmosphere (about 2km above sea level). Considering the above, the research being carried out at 'ARIES', therefore, could prove to be critical in our endeavour to alleviate the negative impact of aerosols.

Set up in 2004, the Aryabhata Research Institute of Observational Sciences – ARIES – is situated atop the Manora Peak (Central Himalayas), about 2 km above sea level. Its high altitude location makes it an ideal place for atmospheric scientists to study and measure levels of aerosols and trace gases in the lower atmosphere. Indeed, as a testimony to the commendable research taking place at ARIES, researchers here already have published over 50 papers, related to atmospheric sciences, in peer reviewed journals. A Review Article, **page 703**, discusses 'some important results obtained from the research facilities of ARIES'.

Society of lion-tailed macaques

THE lion-tailed macaque, a primate found only in India, is an endangered species. Fewer than 4,000 individuals survive in the wild today. Extinction looms. Therefore, to prevent such a contingency, in the wild, conservation programmes are being enforced; and, in captivity, macaque breeding programmes

are being carried out. To ensure the success of these programmes, however, it is imperative that one should be able to address, besides others, three important questions.

The first question: What is the social structure of macaques? Is the macaque's society 'egalitarian', one in which all individuals of a group are equal in rank? Or is it 'despotic', one in which a single individual dominates? **The second question:** When a 'new' male breeding partner is introduced to a captive group of macaques, how will it interact with offspring? In certain primate species, adult males in the wild, after all, sometimes attack, even kill, the offspring when they enter a new group. **The third question:** When a 'new' male breeding partner is introduced to a captive group of macaques, how will it influence the social hierarchy of the group's females?

A Research Communication, in this issue of *Current Science*, addresses these three questions.

In this study, researchers investigated the behaviour of a group of five female macaques whose breeding partner had succumbed to old age. These five females, housed together in the same enclosure, were related: a mother; and her four daughters, one of whom, Andrea, was nursing a baby. The social structure of this group was examined in three different scenarios. First, after the death of their male breeding partner. Second, when a 'new' male, unrelated to any of the females, was housed in a separate enclosure adjacent to the one that housed the females. And third, when the 'new' male was housed together with the females in the same enclosure.

The study reports that the social structure of the captive group exhibited a despotic nature, and followed a 'reverse dominance hierarchy'. Simply put, the mother was the most dominant of them all; while, amongst her daughters, younger sisters dominated their older siblings. Intriguingly, when the male was housed in the adjacent enclosure, the social hierarchy reversed, and, now, older siblings dominated their younger sisters.

To learn more about the development of the social relationships in the group, turn to **page 803**.

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