working constantly in any field will have enough problems for fresh students.

Now the question arises: 'What can be done to improve the situation?' Three things can be done:

1. The selection of the university teachers can be made more rigorous, if possible at the national level, than relying on local selection committees.

2. The UGC/UGC-CSIR NET can be modified with more emphasis on research aptitude, and

3. Universities can introduce entrance test for those who have not passed UGC/UGC-CSIR NET/GRE/GATE etc. for registering for a Ph D.

About the dynamics of the psychology of research students, I am aware of one. All students start their Ph D programme with an intention (hope!) of completing it in 3–4 years. Some of them who have teamed up with *not too enterprising* guides take very long (7–8 years). It takes 2–3 years for the student to realize that the guide is not very helpful. The student continues because he/she feels that in another 1–2 years the work can be completed. And it is better to spend a little more time than losing the efforts already put in for 2–3 years. After another year if the situation still remains the same, the student continues. As time passes, the time required to complete Ph D becomes increasingly a lower fraction of the time already spent. There are societal compulsions also (of relatives and friends scorning 'he/she is not intelligent enough to get a Ph D'). The end of this prolonged (perennial) suffering is when both the student and the guide get totally fed-up, and the guide decides to resort to the Parkinson's fifth (?) law. This leaves an incompetent guide with one more feather in his/her cap (of having produced one more Ph D) and a student who has lost all interest in research (possibly some interest in life also), overaged with a Ph D degree which at present does not have a ready market.

Finally, I would like to disagree with Sitaramam in his suggestion that we should plan our programmes on the basis of the average performers. In my opinion we must strive for excellence and excellence alone. Planning on the basis of average performer results in compromise. Compromises make more compromises necessary. And all these compromises spoil the system.

S. JOHN

Shibu Nivas, Sagar Park,
S. No. 46/9, Nagar Road,
Pune 411 014, India

SCIENTIFIC CORRESPONDENCE

Recent finds of ancient gold mining sites in south Uttar Pradesh

A prominent ancient gold mining site was recently discovered by the authors[1] in the Precambrian Shield region of Uttar Pradesh. It is located about 2.5 km west of Gurmura village in Sonbhadra district (Figure 1). The clusters of old workings are spread over an area about one km in strike length and over 600 m wide. It can be divided into northern, central and southern parts. The northern part shows seven elliptical to rectangular trenches measuring up to 30 m × 10 m × 10 m in size with an incline aimed to exploit easterly plunging ore body. The main hillock, locally referred to as Sona Pahari, forms the central part of the area of old workings. It has large trenches, the largest being about 60 m × 10 m × 10 m located on top of the Sona Pahari. The southern part extends over a length of about 500 m. This has two main trenches. The larger measures about 30 m × 5 m in plan. Both the trenches have inclines. Mishra[2] had speculated about the possibility of gold mining at Sona Pahari (golden hillock) on phonetic connotation and also on the basis of its location in the provenance of Ashokan rock edicts, which are strikingly common in gold-bearing regions of India.

Regionally, the early to middle Proterozoic rocks of southern UP, correlated with the Bijawar[3] Group, rest over a granitic basement, viz. the Dudhi Granitoid exposed to the south, and are overlain by late Proterozoic Vindhyan sediments exposed to the north (Figure 1). The area exposes a dominantly argillitic sequence with minor graywacke–arenite intercalations referred to as the Parsoi Formation[4] of Bijawar Group. The argillites show E–W to ENE–WSW-trending foliation with high dips generally towards south. The succession of metamorphosed chemogenic sediments comprises banded hematite quartzite/jasper, banded magnetite quartzite; argillite sequence consisting of phyllite–graywacke–arenite units and the associated volcanics consisting of a suite of basic to ultra-basic phases, agglomerates and tuffs. The Group compares well with the Precambrian Greenstone Belts[5]. The argillite sequence is intruded by a number of quartz veins with sympathetic trend emplaced probably synchronous to the emplacement of a granitic pulse, viz. the Jhirgadandi granite, in the adjacent area. The mineralized quartz veins are oxidized on the surface and exhibit pyrite, arsenopyrite and galena. Narrow zones of wall rock alteration, indicating carbonatization and kaolinization, signify hydrothermal action. The mineralization appears to be controlled by E–W to ENE–WSW-trending folds and the ancient miners seem to have excavated the richest portion of ore emplaced along the axial-plane shears of the doubly plunging folds with plunge around 35°.

The analytical results for the major trace elemental contents of 50 surface grab samples collected from the area indicate the presence of gold and silver along with other associated metallic elements. Forty-three per cent of samples analysed by Atomic Absorption unit at chemical laboratories, Geological Survey of India at Lucknow, Hyderabad

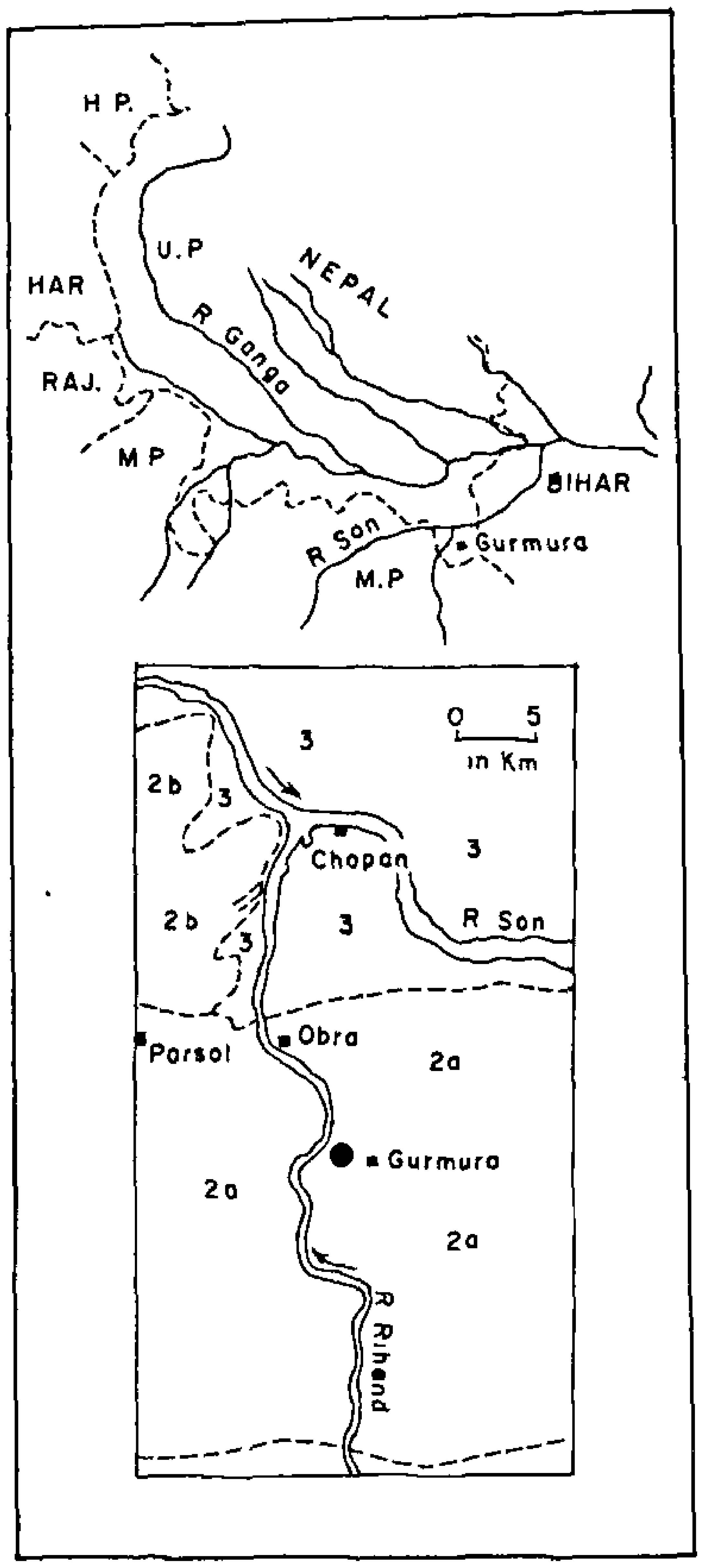

Figure 1. Geological map and location of ancient mining sites around Gurmura, Sonbhadra District, UP Index 3 – Vindhyan Super Group, 2b – Agori Formation; 2a – Parsoi Formation; 1 – Dudhi Granitoid, 0 – Location of old workings.

and Calcutta, indicated anomalous gold analysing from 0.10–2.80 ppm Au with

Table 1

Lithology	Anomaly (%)	Au range (in ppm)	As range (in ppm)	Arithmatic mean for Au (in ppm)
Quartz vein	95	0 10–2.80	200–3000	0 83
Phyllite	5	0 16	n d	0 16

5–55 ppm Ag, 35–535 ppb Hg, up to 0.34% Cu and 0.12% Zn, 200–3000 ppm As, average 1.9% Pb and up to 20 ppm Cd (analysed in one sample). About 95% of anomalous values are from quartz vein samples and 5% are from argillite lithology. The anomaly distribution is shown in Table 1.

Preliminary limited analytical data indicate the presence of Au, Ag, Cd, Pb, Cu and Zn. The favourable geological set-up for mineralization and the associated extensive old workings make it a new prospect. Detailed geochemical sampling, presently in progress, is likely to reveal the exact nature of mineralization.

A noteworthy find includes the presence of a large number of crude stone crushers and mortars scattered throughout the area. The stone mortars have elliptical depressions measuring 20 cm × 15 cm in plan and are mainly of hard arenitic or doleritic rocks. The find suggests that grinding was an important stage in winning or concentrating the ore. The gold was extracted in a phased manner. Evidences of ancient gold mining and extraction in similar manner along with similar stone crushers and mortars have also been recorded from the contiguous western area around Sudda[6], Sonkorwa, Matehni and Gurhar Pahar[7], etc., situated in the Sonbhadra District, UP, and Sidhi district, MP. The absence of slag material, retorts, etc., associated with smelting of base metals, indicates that the base metals have not been extracted and all the mining activity was for gold only.

As regards the age of the ancient mining activity, the preponderance of stone crushers and mortars with occasional finds of iron chiesels, etc., point to ancient historical period. The age of gold mining is pre-Mauryan and might be pre 2400 BC.

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G. N. DWIVEDI
R. C. TYAGI
A. K. TRIPATHI
M. L. YADAV

Geological Survey of India, Lucknow 226 020, India

Parasitism of muscardine fungi on *Meloidogyne incognita* eggs

Root-knot nematode, *Meloidogyne incognita* (Kofoid and White) Chitwood, is a serious pest in vegetable and pulse crops in India[1]. Several biocontrol agents have been reported on root-knot nematodes the world over. Some of the bioagents are found very useful in managing the nematode problem in agricultural crops[2]. Hence, in this context, two important entomopathogenic muscardine fungi, *Metarhizium anisopliae* (Metch.) Sorokin and *Beauveria brongniartii* (Sacc.) Petch, commonly used for the management of root grubs, cutworms and termites, were tested for their pathogenicity against eggs of *M incognita* in the laboratory.

The fungi were tested against fresh eggs obtained[3] from egg masses collected from infested roots of tomato following petri dish bioassay technique[4]. Spores of respective fungi were sprayed on 2% water agar plates at the rate of 10^7 conidia/plate; each plate was previously charged with 25 eggs of the nematodes. In control plates, only sterile distilled water was sprayed. Treatments were replicated four times using completely randomized design. Plates were incubated at 27 ± 1°C and fungal