few specimens of banded skarn there is evidence of amphibole replacing biotite which may have been derived from metapelitic rocks in which it interbeds. The biotite is otherwise extremely rare in the skarns of the area.

The skarn is generally believed to have been formed as a result of metasomatic interaction between magmatically derived fluids and carbonate rocks[4,5]. However, formation of skarn by other processes such as diffusion, infiltration, direct marble-metasedimentary rocks reaction etc are also reported[6]. The absence of sequential monomineralic bands adjacent to marble and non-existence of the latter do not support diffusion hypothesis. Development of skarn by direct carbonate-pelite reaction is also not feasible on the chemical, mineralogical and field characters. The predominance of hedenbergite, ferrohastingsite and grossular-almandine needs high iron (ferrous) source and the released calcium from the carbonate rock during skarn-forming process does not show expanding skarn zone in the study area as reported from Garnet Hill by Brock[6]. Further, the skarns are in very close proximity of the gneisses and the occurrence of calc-hornfels is also not reported indicating direct metasomatism of the calcareous rocks in contact with Chaur granite. The mineralogy of the skarn, presence of Ca-bearing phases such as epidote, sphene and hornblende in the proximity of gneisses and metasediments, absence of characteristic banding suggest transport of the elements Si, Al, Mg and Fe through moving fluids derived from magmatic source giving rise to infiltration skarn in the terminology of Korzhinskii[7]. The predominance of hedenbergite, ferrohastingsite and grossular-almandine garnet indicates ferrous-dominated skarn. This is also evident from the whole rock chemistry of skarn in which Fe_2O_3 ranges from 0.66 to 3.59 and FeO from 2.26 to 21.22 attesting to the fact that the skarns were produced in a relatively low fO_2 environment.

Calc-silicate and marble are reported from many parts of Himalayas but the occurrence of skarn rock in Himalayas in general and Chaur area in particular is not known. Hence this report is very significant as it records the first skarn deposit in Himalayas which has been misidentified as eclogite.

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PEARSON DISTRIBUTION OF NITROGEN-FIXING POTENTIAL AMONG *NOSTOC* STRAINS

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BIOLOGICAL nitrogen fixation in natural or agricultural ecosystems is rarely limited by a lack of nitrogen-fixing micro-organisms. Nevertheless, very little nitrogen is fixed in nature. Apart from the ecological stresses, the efficiency of the strains themselves may play an important role. The present communication deals with the frequency distribution of nitrogen-fixing potential (acetylene reduction) of 86 strains of *Nostoc* belonging to 14 species complex.

All the strains were grown in Fogg's nitrogen free medium[1] supplemented with A_5 solution[2] under a constant temperature of $30 \pm 1°C$ and illumination of 2,000 lux.

Acetylene reduction activity (ARA) was measured using a gas layer chromatograph (Nucon Model 5500) with a Porapak R column[3]. Acetylene equal to 10% of the total volume was injected and the vials were incubated for 90 min at 30°C under 2,000 lux. The reaction was terminated by injecting 0.1 ml TCA (50%) and the gas phase was analyzed for ethylene.

Table 1 shows the range of ARA values among 14 species complex. The overall range of variation was from 0.03 to 6.19.

Table 2 groups the ARA values in the form of frequency distribution with unit ARA value as the class

Table 1 *Range of ARA values (μ mol C_2H_4 mg Chl^{-1} hr^{-1}) in 86 strains of Nostoc sp*

Species complex	No. of strains	Range of ARA
N. carneum	8	0.37–2.59
N. calcicola	6	0.42–1.90
N. commune	1	1.44
N. ellipsosporum	1	2.25
N. entophytum	1	1.20
N. humifusum	2	0.34–2.25
N. linckia	13	0.49–4.33
N. muscorum	13	0.15–4.03
N. paludosum	13	0.03–6.19
N. piscinale	5	0.22–2.35
N. punctiforme	16	0.16–5.20
N. rivulare	3	0.38–3.26
N. microscopicum	1	1.45
N. spongiaeforme	3	1.03–3.55

Table 2 *Frequency distribution of the ARA values of a set of 86 strains of Nostoc sp*

Class value	Observed frequency	Expected frequency*
0.45	33	35.2
1.45	24	25.7
2.45	19	13.2
3.45	6	5.9
4.45	2	2.3
5.45	1	0.8
6.45	1	0.3

* On the basis of Pearson's Type I curve

Table 3 *Statistical analysis of ARA values*

Mean	1.5637 ± 0.1277
Variance	1.4033
Skewness (g_1)	$1.3419^{**} \pm 0.2597$
Kurtosis (g_2)	$2.3437^{**} \pm 0.5139$

**Indicates significance at 1% level

Table 4 *Moments distribution parameters and the distribution curve*[5].

μ_2	1.3870
μ_3	2.1536
μ_4	9.8891
β_1	1.7383
β_2	5.1406
k	−2.0098

The distribution curve is:

$$y = 24.02\left(1+\frac{x}{1.5150}\right)^{0.4113}\left(1-\frac{x}{15.0529}\right)^{13.0265}$$

interval. The main features of statistical analysis are given in table 3 a,b. The negative value of k in table 4 indicates that the distribution is of Pearsonian type I *i.e.*

$$y = y_e\left(1+\frac{x}{A_1}\right)^{m_1}\left(1-\frac{x}{A_2}\right)^{m_2}$$

The frequency distribution of ARA values was postively skewed (figure 1). Both skewness and kurtosis[4] were highly significant, indicating departure from normal values.

For calculating the expected value of the frequencies given in table 2, x is replaced by $(x-\bar{x})/C$, where $\bar{x}$ is the mean of the ARA values of 86 strains, and C, the class interval, equal to 1. Figure 1 shows a close agreement between the observed and expected values of the frequenceis. A rough test of the fit was made by the usual χ^2 test with $7-4=3$ degrees of freedom. Although the Kolmogrov test[6] would have been more appropriate to estimate the areas, the inference drawn from χ^2 test is not likely to differ materially. The observed χ^2 was equal to 4.523 with probability between 0.3 and 0.2 and was thus non-significant, showing thereby that Pearson's type I curve gave a good fit to the observed frequencies. The histogram

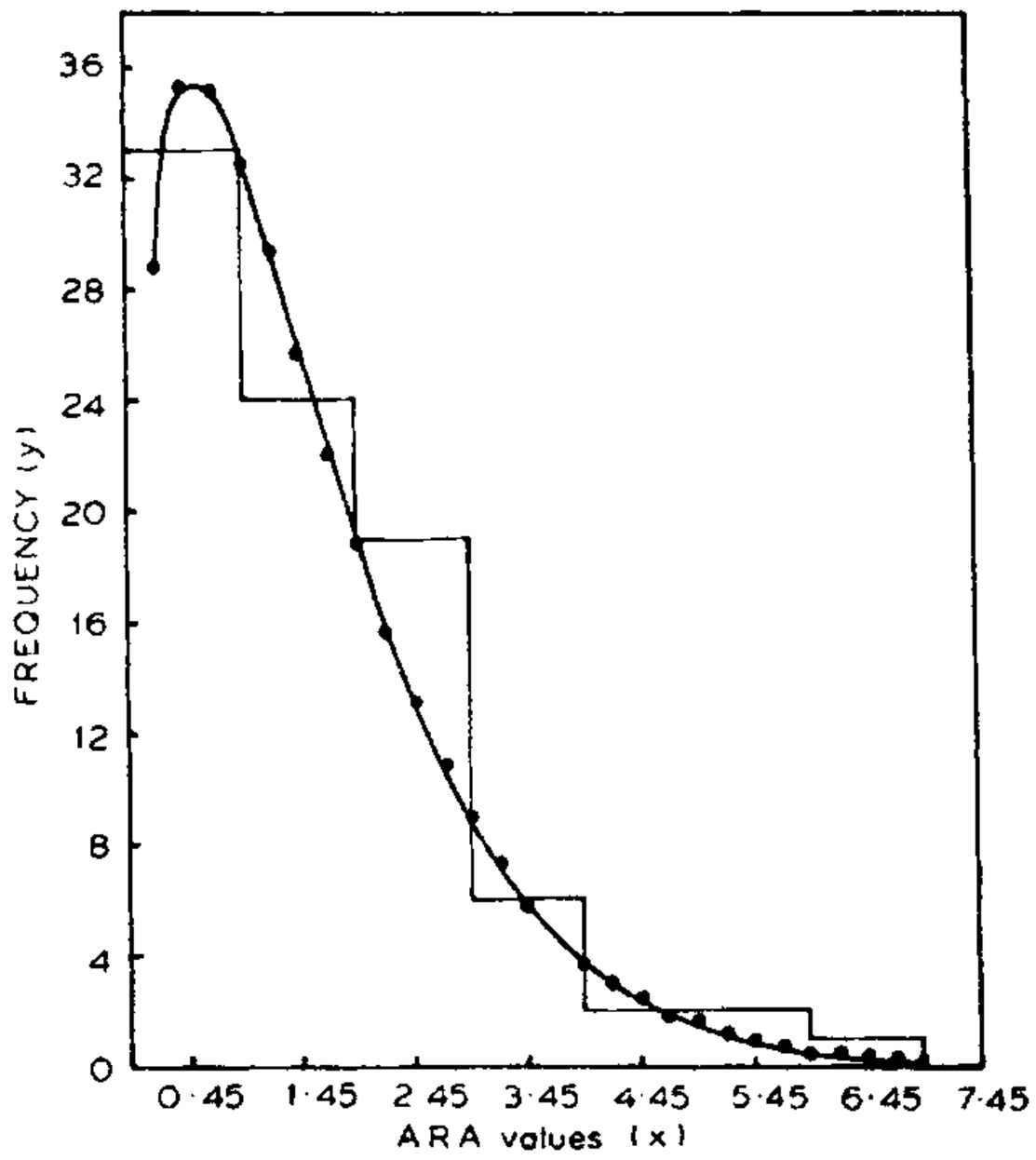

Figure 1. Pearson Type I curve of the frequency distribution of ARA values among *Nostoc* strains.

and the fitted curve are shown in figure 1.

The present observation shows a wide range of inter- and intraspecific variability in the nitrogen-fixing capacity of *Nostoc* which differs significantly from the normal. It is thus clear that if algal nitrogen fixation is aimed at increasing the nitrogen economy, the selection of efficient strains is as important as defining ecological stresses and finding means to overcome them.

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SCANNING ELECTRON MICROSCOPY AND GERMINATION STUDIES OF POLLENS IN THE GENUS *IPHIGENIA* (KUNTH)

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THE genus *Iphigenia* ($2n = 22$) has six species in India, of which *I. pallida* Baker, *I. stellata* Blatter and *I. magnifica* Ansari et Rolla Rao, are widely distributed in the western regions of Maharashtra. These species are mainly classified based on the perianth colour, size and shape of the fruit and position of raphae[1]. In recent years palynological characters have been considered as stable identity to differentiate the species[2]. Light microscopic study of pollens in *I. indica* has been reported[3]. But with the advent of scanning electron microscopic (SEM) application to pollen study many more details about the pattern of exine stratifications are unravelled which is the main approach here. In this note, SEM studies of pollens in the three species of commercial importance, namely *I. pallida* Baker, *I. stellata* and *I. magnifica* are reported.

Methodology: Matured anthers of deep yellow colour were plucked just prior to their anthesis and pollen grains were tested for viability with a mixture of iron aceto-carmine and glycerine (1:1). Prior to the SEM studies pollen grains were acetolysed and SEM studies were carried out at the National Chemical Laboratory, Poona. Germinability test of pollen grains were made in a range of sucrose solutions from 2 to 6% at room temperature (23–25°C) by hanging drop technique. Germination counts were made after 24 hr when the pollen tubes have emerged from most of the pollen grains.

Pollen morphology

I. pallida—medium-sized pollen grains (36.36–27.7 × 27.7–19.09 μ), monocolpate, prolate, saucer-shaped, radially symmetrical, colpus long, finely defined, colpus membrane granuate, exine margin supporting with microechinate projections. Ornamentation tectum perforatum, muri relatively thick, pointed

Table 1 *Summary of selected pollen morphological features of Iphigenia*

Genus and Species	Pollen grain size range*	(L × B) in microns average*	Ratio of polar to equatorial axes (P/E)	Pollen class	Pollen shape	Ornamentation types
I. pallida	36.36 – 27.27 × 27.27 – 19.09	34.09 × 24.27 ± 1.14 ± 0.87	1.44	ME	Prolate	Tectum, perforatum. Muri pointed at end.
I. stellata	36.36 – 22.73 × 31.82 – 22.73	28.46 × 26.63 ± 1.34 ± 0.77	1.07	ME	Prolate spheroidal	Rugate. Muri interrupted and arranged in short curved sections.
I. magnifica	27.27 – 22.75 × 25.00 – 22.27	25.27 × 23 ± 0.61 ± 0.21	1.1	MI	Prolate spheroidal	Tectum perforatum to microreticulate

* Mean of 25 readings; ± – S.E.