



Figure 1. *a*, Scanning electron micrograph of AnpCh57 showing hyphae and immature ball-shaped vesicle; *b*, View of ball-shaped vesicles and lysed hyphae of AnpCh57. Bar: 10 μ m.

Table 1. Vanadium nitrogenase activity of AnpCh57

Days of growth in DPM* containing 50 nM vanadium	C ₂ H ₂ reduced/mg fr wt/h	
	5°C	28°C
10	4.59 \pm 0.4	2.01 \pm 0.3
15	6.30 \pm 0.5	3.42 \pm 0.2
20	6.20 \pm 0.4	3.46 \pm 0.2

*Na₂MoO₄ was deleted from DPM.

Note: Acetylene reduction activity of spherical vesicles after 15 days at 28°C in DPM containing molybdenum was 6.0 \pm 0.3.

rvation of these colonies under microscope and soft X-rays showed the presence of spherical vesicles after day 30 and both spherical and ball-shaped vesicles after day 45. This and earlier results demonstrate that both vesicles are produced at different times. Thus it could be hypothesized that AnpCh57 produces vanadium nitrogenase during molybdenum deficiency. Vanadium nitrogenase though less efficient at 28°C, would be advantageous since vanadium is less limiting under natural conditions⁴. It is also possible that vanadium nitrogenase is best suited for low temperatures. Thus diverse *Frankia* may expand physiological range of nitrogen fixation by these multiple enzymes.

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Sacred grove relics as bird refugia

Sacred groves are patches of natural vegetation dedicated to certain local deities, from which no harvesting of living matter is permitted by the local communities. Ecologists currently recognize these sacred groves (SG) as a unique cultural institution for conserving local biodiversity¹. Numerous sacred groves are among the last representatives of climax vegetation in the Western Ghats and North East India, whereas SGs in other parts of the country have dwindled due to colonial land use policies^{1,2} and erosion of traditional values regarding natural resource use. Nevertheless, hundreds of relics of SGs

exist in the tribal tracts of eastern India, and much of the tribal cultural life in West Bengal has been reported to be still centred around these relics³.

The observations we report here are a fallout of an ethnobiological survey we conducted from early April to end-June, 1996 in Jamboni, Jhargram, Gidhni, Belpahari and Banspahari Forest Ranges of western Midnapore district. In conformity with our previous study³, we found remnants of SG in almost every tribal village in the region. Most of these groves, locally called Jahiristhan, are relics of ancient SGs, containing 10–20 trees, amidst a denuded lateritic

expanse. The tree species mostly found in these relics include sal (*Shorea robusta*), asan (*Terminalia tomentosa*), karam (*Adina cordifolia*), banyan (*Ficus bengalensis*), aswath (*F. religiosa*), pial (*Buchanania lanzan*), piya-sal (*Pterocarpus marsupium*), neem (*Azadirachta indica*), and mahua (*Bassia latifolia*). All these species are also found in sal forests, albeit mostly in reproductively immature stages.

The sal coppice forest patches in the region under study are highly degraded, and are now regenerating under community protection by villagers' Forest Protection Committees over the past