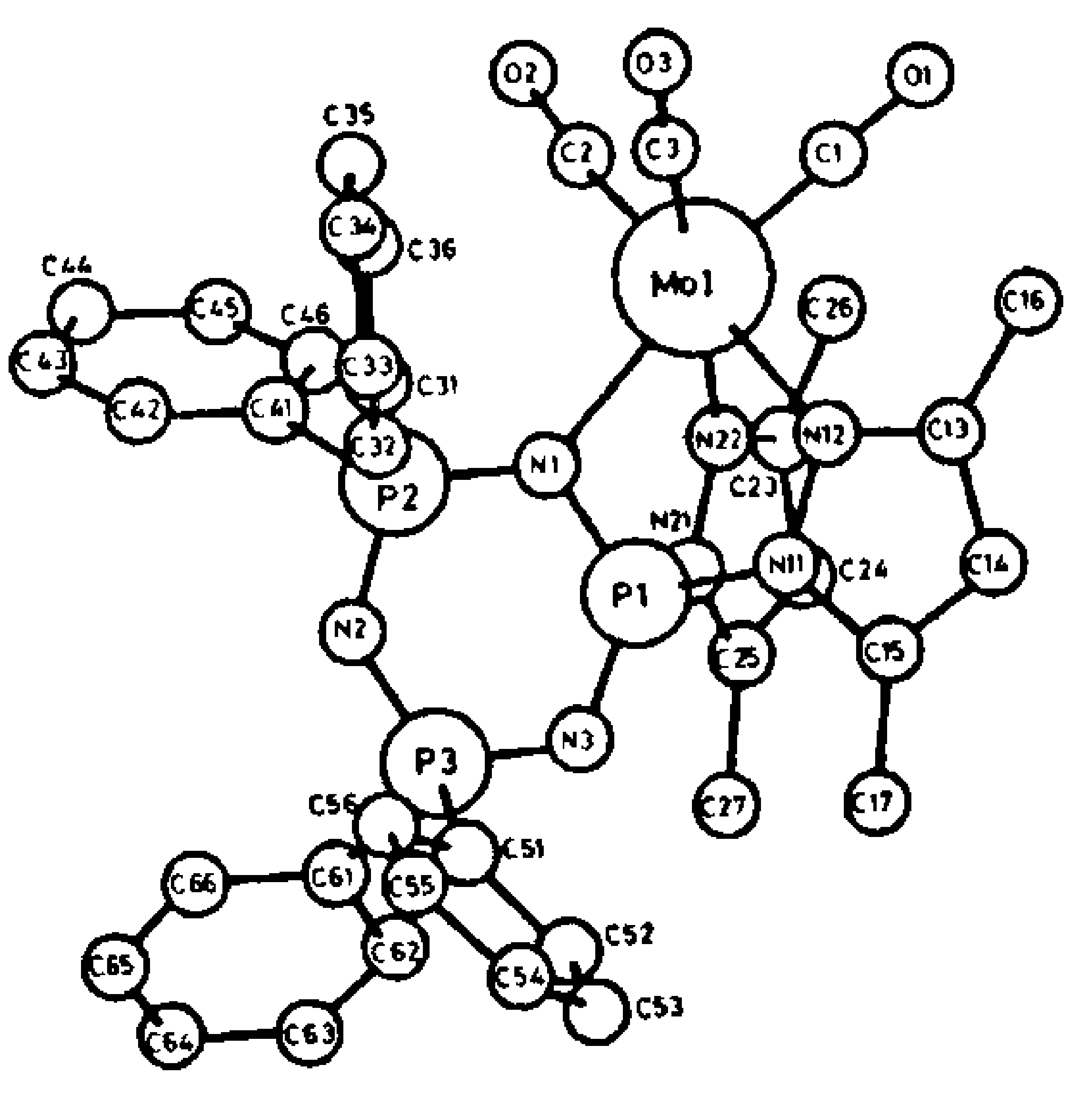
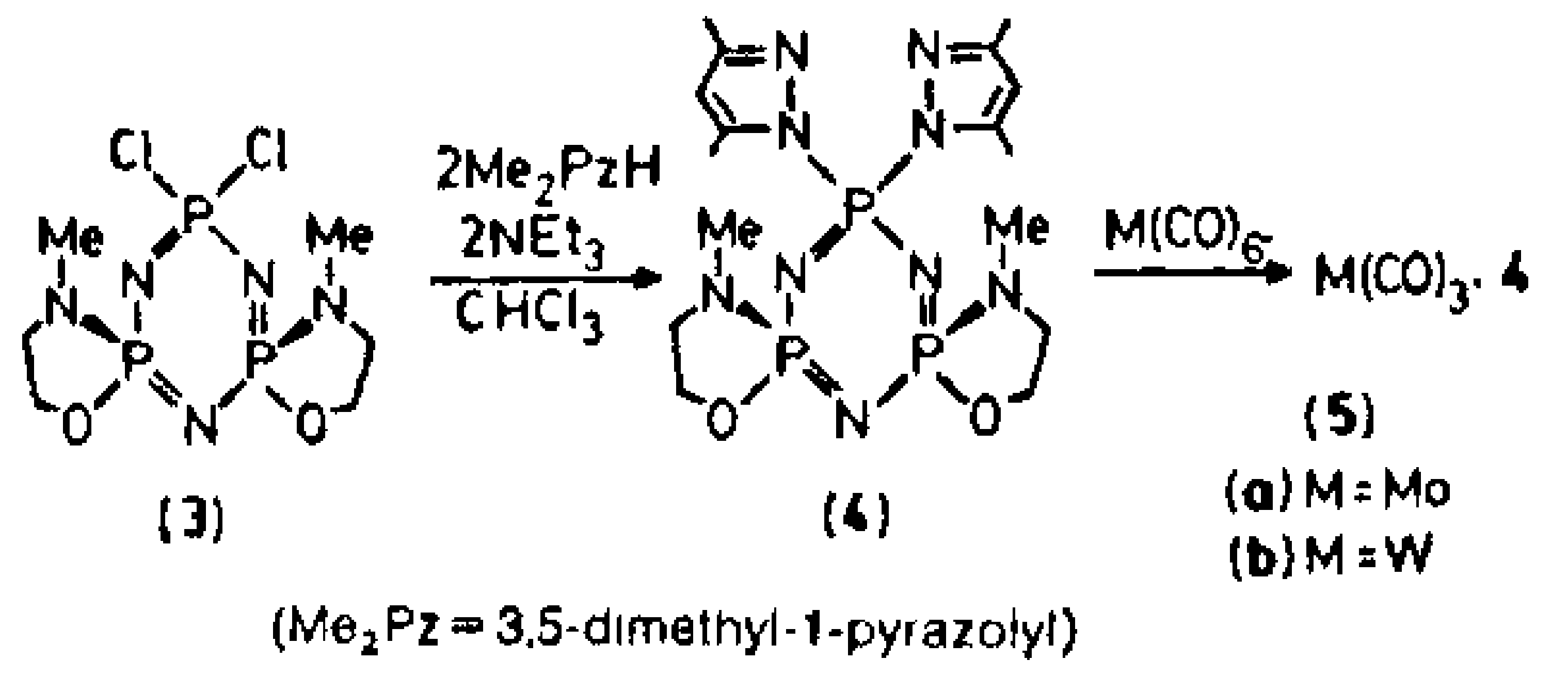


Figure 1. PLUTO diagram of compound 2. Selected bond lengths (Å) and bond angles (°) are as follows: Mo–C1 = 1.910 (3); Mo–C2 = 1.934 (3); Mo–C3 = 1.939 (3); Mo–N1 = 2.394 (2); Mo–N12 = 2.299 (2); Mo–N22 = 2.311 (2); P1–N1 = 1.593 (2); N1–P2 = 1.637 (2); P2–N2 = 1.598 (3); N2–P3 = 1.588 (3); P3–N3 = 1.626 (2), N3–P1 = 1.557 (2); C1–Mo–C2 = 82.6 (1), C1–Mo–C3 = 82.4 (1), C2–Mo–C3 = 84.4 (1), N1–Mo–N12 = 73.8 (1), N1–Mo–N22 = 73.4 (1), N12–Mo–N22 = 79.5 (1); phosphazene ring angles at P1 = 122.4 (1), P2 = 114.4 (1), P3 = 115.9 (1), N1 = 120.1 (1), N2 = 126.3 (2), N3 = 120.1 (1). Crystal data for 2: Triclinic, P$\bar{1}$; $a = 10.764(4)$, $b = 11.591(2)$, $c = 15.113(2)$ Å; $\alpha = 100.98(2)°$, $\beta = 89.52(4)°$, $\gamma = 78.26(4)°$; $V = 1810$ Å$^3$; $Z = 2$; $T = 291$ K; $\lambda(\mathrm{MoK}_\alpha) = 0.71069$ Å; 8057 observed reflections ($F > 6\sigma(F)$) ($1 < \theta < 30$); Solved by the Patterson heavy atom technique and refined by difference Fourier syntheses using SHELEX76; The final $R = 0.0398$; $R_w = 0.0477$. Further details of the structure can be had from the authors.

bonds (2.299 (2), 2.311 (2) Å). As a consequence, the metal-carbon bond opposite to the phosphazene ring nitrogen atom is shorter (1.910 (3) Å) than the other metal–carbon bonds (1.934 (3), 1.939 (3) Å).

Since compound 2 is insoluble in common organic solvents, we have attempted to modify the ligand to overcome this problem. We have prepared bis(*N*-methylethanolamino) bis(3,5-dimethyl-1-pyrazolyl) cyclotriphosphazene 4 from the structurally characterized dichloro bis(*N*-methylethanolamino) cyclotriphosphazene (3)[5]. Treatment of this ligand with $M(CO)_6$ (M = Mo or W) yields soluble metal tricarbonyl complexes, $[M(CO)_3 \cdot 4]$ (5). They are assigned a structure similar to 2 on the basis of IR, $^1H$ and $^{31}P$ NMR data. The $^{31}P$ NMR spectrum of 4 showed an $A_2X$ pattern ($\delta_A = 31.2$, $\delta_X = 6.1$ ppm; $J_{AX} = 68.0$ Hz); the spectrum of 5a showed an $ABX$ pattern ($\delta_A = 30.6$, $\delta_B = 27.3$, $\delta_X = -3.3$ ppm; $J_{AX} = 66.1$, $J_{BX} = 60.8$, $J_{AB} = 50.5$ Hz). Single-crystal X-ray structure determination of compound 5b is in progress.



(Me$_2$Pz = 3,5-dimethyl-1-pyrazolyl)

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# A new fossil pollen record—*Transdanubiaepollenites* Kedves & Pardutz from the Neyveli lignite deposit, South India

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**Well-preserved fossil pollen of *Transdanubiaepollenites* Kedves & Pardutz, previously reported from the Eocene of Hungary, has been recovered for the first time from the Miocene sediments of South India. The present record is significant as it extends the stratigraphic range of *Transdanubiaepollenites*. I propose new species, *T. indicus*.**

THE form genus *Transdanubiaepollenites* was proposed by Kedves & Pardutz[1] for pollen characterized by three narrow colpi, retipilate exine and ornamented lumina, and described under *Transdanubiaepollenites magnus*. Pollen grains recovered by me from lignite core samples of Mine III, Neyveli Lignite Field, South India[2] (Figure 1) are distinct in having thicker exine, shorter colpi; lumina of varying size and shape (usually polygonal), and muri thickened at the joints. I have given the specific epithet *indicus* after the name of the country. The genus differs from *Retitrescolpites* Sah, in having ectonexine comprised of free bacula/spines and ornamented lumina[3].

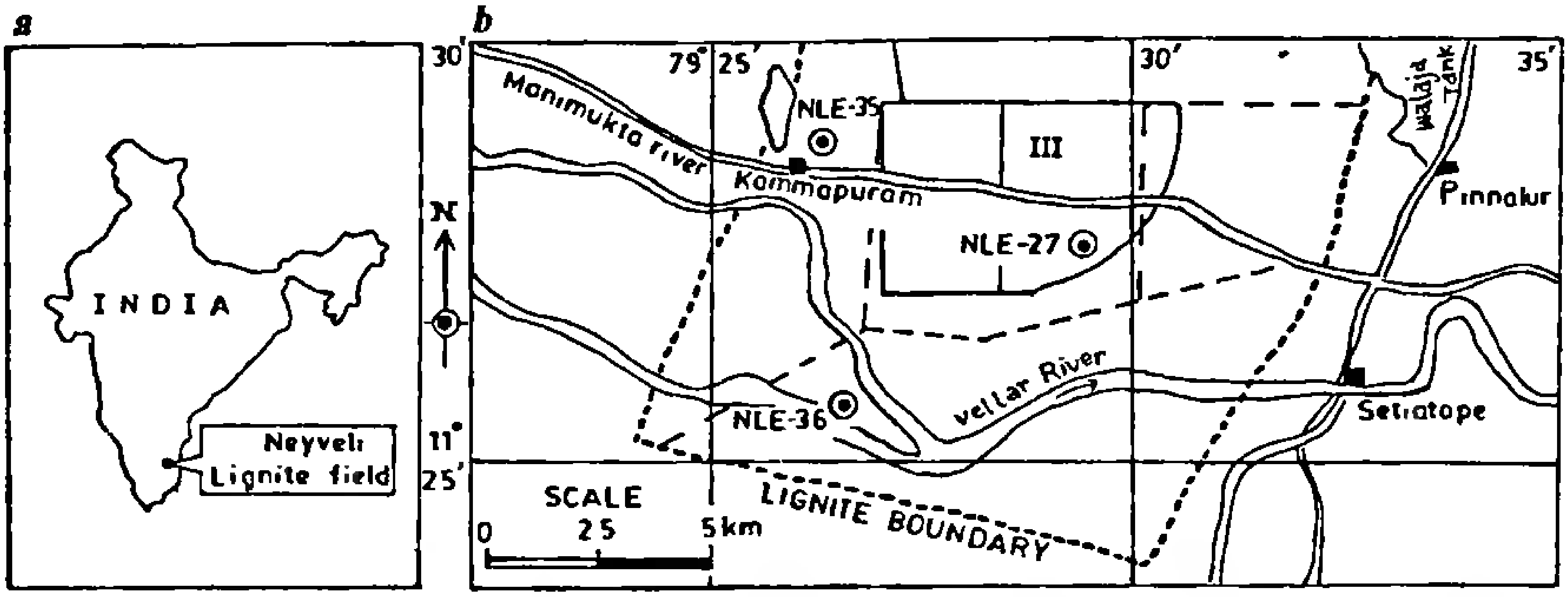

**Figure 1.** Map showing location of (*a*) Neyveli Lignite Field, (*b*) investigated bore-holes in Mine III.

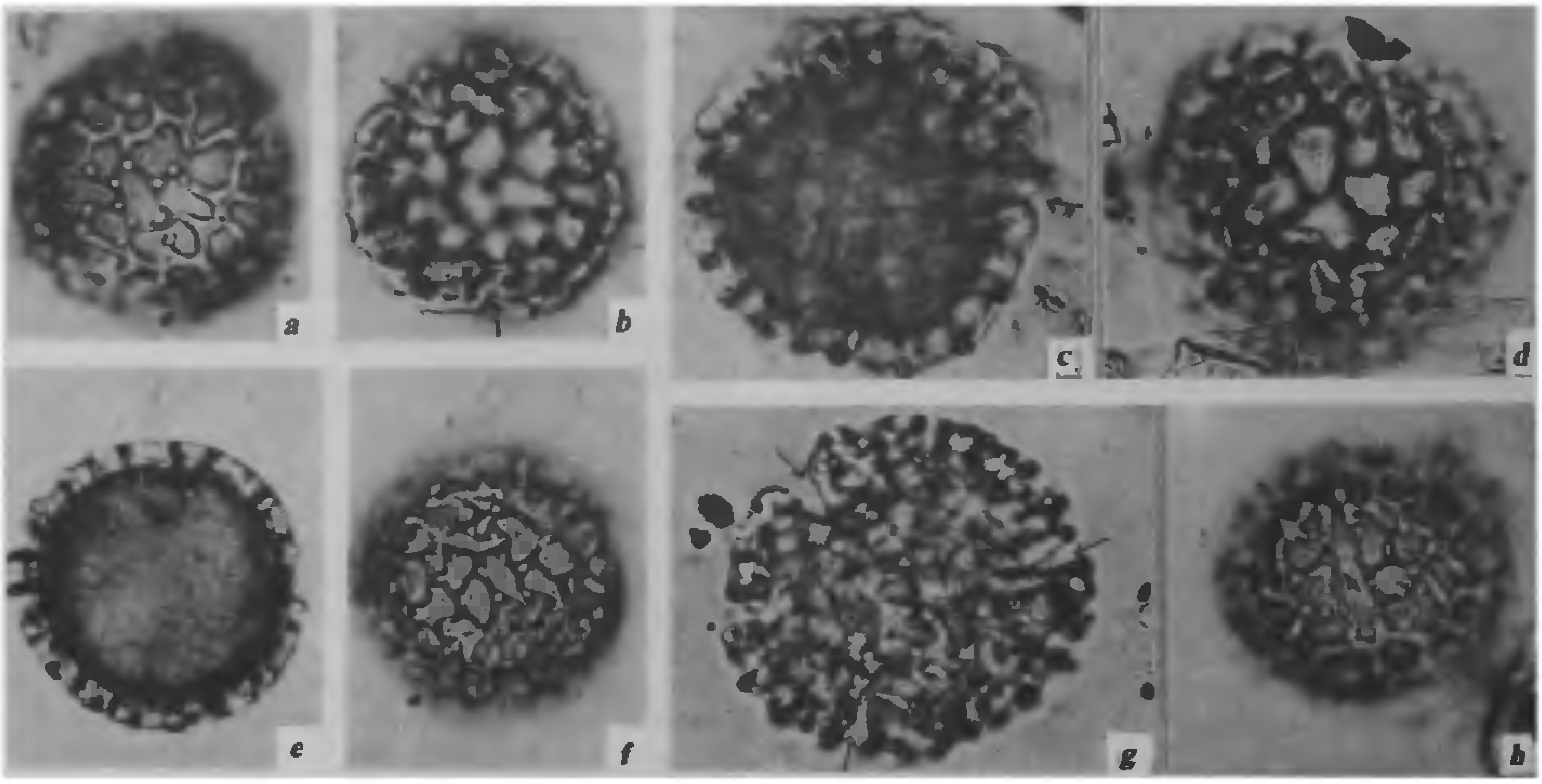

**Figure 2.** *Transdanubiaepollenites indicus* sp. nov. ***a***, Specimen in ***b*** focused to show reticulation, film no. 23/11; ***b***, holotype, slide no. 10507, K 43, film no. 23/12; ***c,d***, slide no. 10509, V 56/1, film No. 27/7,6; ***e,f***, slide no. 10507, film no. 23/15, 14; ***g***, slide no. 10508, V 37/4, film no. 23/16; ***h***, equatorial view of pollen illustrated to show colpus, slide no. 10219, film no. 27/19. All specimens magnified to ca 750 ×.

*Transdanubiaepollenites indicus* sp. nov. (Figure 2).

*Holotype*: Slide no. BSIP 10507, K 43, Figure 2,*b*; size 43 μm.

*Type locality*: Neyveli Lignite Field, South Arcot District, Tamil Nadu, South India.

*Horizon and age*: Cuddalore Formation, Miocene.

*Diagnosis*: Pollen ± circular, tricolpate; colpi long and narrow, bordered by muri; exine comprised of a perforate tectum, columellae layer, free bacula/spines and nexine; sexine thicker than nexine; lumina ornamented, varying in shape and size, muri simplipilate.

*Description*: Pollen circular to subcircular in polar and equatorial views, 35–60 μm, tricolpate; colpi 9–15 μm long, 2–3 μm wide towards contour, usually undifferentiated from the surface reticulation, colpus margin bordered by muri with (Figure 2,*h*) or without pila heads; exine 4–9 μm, comprised of a perforate tectum (1.5–3.0 μm), columellae layer (base of pila), free bacula/spines (ectonexine) and nexine (1.5–2.0 μm), sexine 2–3 times thicker than nexine; lumina 2–13 μm across, ± polygonal (irregular if compressed) with reticulate/granulate pattern formed of ectonexine; muri straight or curved, simplipilate, may be thickened at joints, with or without pila heads at each joint.

The slides and negatives have been deposited in the repository of the Birbal Sahni Institute of Palaeobotany, Lucknow, India.

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# The menstrual cycle in a human female under social and temporal isolation is not coupled to the circadian rhythm in sleep–wakefulness

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**We investigated the circadian rhythm in sleep–wakefulness (SW rhythm) and in the rectal-temperature profile (Temp rhythm) of a 24-year-old female subject under conditions of social and temporal isolation. The subject stayed in the isolation facility, fitted with basic living amenities but devoid of time cues, for 35 days. In isolation the Temp rhythm of the subject freeran with a period of 25.1 ± 0.8 h, but her SW rhythm freeran with a period of 45.9 ± 2.1 h (circabidian), resulting in desynchronization of the two rhythms. In 35 calendar days the subject experienced only 22 subjective, sleep–wakefulness days. Interestingly the menstrual cycle of this subject was normal, i.e. two episodes of onset of menses occurred 28 calendar days apart. We conclude in this first report on the subject that the menstrual cycle in the human female may not be coupled to the circadian rhythm underlying sleep–wakefulness while under social and temporal isolation.**

NEARLY a hundred bodily functions in humans show 24-h daily rhythms that are all in synchrony with the sleep–wakefulness (SW) cycle[1]. All these rhythms are entrained by light–dark (LD) cycles and the social cues that accompany day and night[2,3]. In human subjects living in isolation, screened from the LD cycles of nature and social and other *zeitgebers* (time cues), the bodily rhythms persist and 'freerun' with periods close to 24 h (circadian), advertising their endogenous (genetic) origin. The best markers of the circadian organization in humans are the SW rhythm and the rectal Temp rhythm, which are also easily and reliably measured. The two parameters maintain mutual synchrony in entrainment and freerun. But in roughly 30% of humans studied in isolation facilities and bunkers the SW and Temp rhythms dissociated and freeran with markedly different periods, causing 'internal desynchronization'[4]. In addition to the circadian rhythms in the human female there is a circalunar monthly menstrual rhythm. The relationship between the circadian rhythm in physiological processes and the menstrual rhythm has not been investigated. In fact, a monograph written on the subject in 1981, *Circadian Rhythms and the Human*[5], does not mention the menstrual cycle in the text even once. It has, however, been reported that onset of oestrus in the golden hamster does have a circadian component and that the period of the oestrous cycle also lengthened under freerunning conditions and oetrus occurred once in four circadian cycles of the activity rhythm[6]. The present report appears to be the first scientific one on this subject for humans even though it is based on only 47 'woman-day' data (including four days prior to and eight days after the 35 days of isolation) and the experiment was carried out on a single female human subject.

The isolation facility consisted of a double-walled bunker impervious to natural light and external noise. It had a large living area, a kitchenette and a bath. Fluorescent tubelights constituted the light source. The temperature was held constant around 25°C and stored water of uniform temperature was available for use. The isolation facility was devoid of potential *zeitgebers*, viz. clocks, radios, TV, current periodicals, etc. The occasional food and other requirements of the subject were placed in an antechamber, and there was no social contact for the duration of the experiment. Communication with the outside was mostly through scribbled notes.

The subject was a 24-year-old, presumably healthy female with a history of regular, predictable menstrual cycles of about 27–29 days. The core body temperature of the subject was measured using a rectal temperature probe. Ambulatory movements were measured by a wrist monitor. The temperature and activity levels were sampled at six-minute intervals and data stored in a battery-powered solicorder device. Data retrieval was done at random intervals to avoid giving inadvertent time cues to the subject. The subject activated individual buttons on a wall-mounted panel for different functions like 'to bed', 'sleep', 'wake-up', 'food', 'exercise', etc., which were conveyed to an Esterline Angus event recorder, thereby providing a function–time profile for each subjective day.