Table 1. Shell weights (μg) of foraminifera species *Pulleniatina obliquiloculata*. $CO_3^=$ (μmol/kg) calculated using the program developed by Takahashi; pressure-normalized carbonate ion concentration, [$CO_3^=$*] calculated from Broecker and Clark[10], $CO_3^=* = CO_3^= + 20(4 - h)$: where h is the depth (in km); $\Delta CO_3^=$ values calculated as $CO_3^=* - CO_3^=$

Station	Depth (m)	Latitude	Longitude	Shell weight *P. obliquiloculata*	$CO_3^=$	$CO_3^=$*	$\Delta CO_3^=$
SK199C/6	2250	8.13°N	73.56°E	33.17	77.59	112.59	35
SK199C/10	3305	7.36°S	67.17°E	29.11	83.61	97.51	13.9
SK199C/9	3320	4.86°S	67.09°E	32.05	83.70	97.29	13.6
SK199C/14	3368	15.27°S	66.01°E	35.1	83.97	96.61	12.64
SK199C/11	3373	9.17°S	65.95°E	31.63	83.99	96.54	12.54
SK199C/7	3944	5.51°N	69.34°E	26	87.25	88.37	1.12

bottom water $\Delta CO_3^=$, from the Indian Ocean as given below.

$\Delta CO_3^=$ = [*P. obliquiloculata* shell weight (μg) – 24.53]/0.2759.

Using the above relation and shell weights of *P. obliquiloculata*, we calculated $\Delta CO_{3\ \text{interface}}^=$. The gradient ($\Delta CO_{3\ \text{interface}}^= - \Delta CO_{3\ \text{bottom water}}^=$) was then calculated using, $\Delta CO_{3\ \text{bottom water}}^=$ values (Table 1).

Thus, we obtain a value of +4.2 μM at 3900 m water depth. de Villiers[12] determined the $\Delta CO_{3\ \text{interface}}^=$ to be within ± 10 μM of bottom water. Shell weight measurements from both *Globigerinoides sacculifer* and *Globigerinoides ruber* suggest that there exists no significant gradient in $\Delta CO_3^=$ across the sediment–bottom water interface below a depth of 1000 m in the Indian Ocean. Our value of +4.2 μM falls within the range of ±10 μM, suggesting that dissolution of carbonate around 3900 m water depth is due to undersaturation in $CO_3^=$ concentration of bottom waters.

Calcium carbonate dissolution starts around 2250 m and intensifies at 3900 m in the tropical Indian Ocean[8]. We needed to study whether this intense dissolution occurring at 3900 m is a result of undersaturation of overlying bottom waters with respect to carbonate ion. This is important in order to know the calcite saturation depth in the western tropical Indian Ocean, which is necessary to understand the oceanic response to the currently increasing CO_2 levels. We used the relationship between *P. obliquiloculata* shell weight and bottom water $\Delta CO_3^=$ from the core top data of Broecker and Clark[11] and data from the present study. We calculated $\Delta CO_{3\ \text{interface}}^= - \Delta CO_{3\ \text{bottom water}}^=$ to be +4.2 μM, which is within ±10 μM of bottom water, the value derived by de Villiers[12]. This suggests that there is no gradient in $\Delta CO_3^=$ across the sediment–bottom water interface at a depth of 3900 m. Therefore, we conclude that the intense dissolution along this transect in the western tropical Indian Ocean is due to bottom water $CO_3^=$ undersaturation.

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Corallodiscus Batalin (Gesneriaceae): A new generic record for Eastern Ghats, Orissa

The floristics of southern Orissa, often considered incomplete, was sporadically approached by Mooney, Gamble, Haines and subsequent workers. Hence, it provides an ideal background for further exploration and discovery of taxonomic novelties. We collected an interesting specimen belonging to family Gesneriaceae from Similipadar Hills (19°41′12.53″N, 83°4′28.97″E) in the Karlapat range, Kalahandi District, part of the Eastern Ghats, Orissa. Critical analysis and scrutiny of the floristic work done by several researchers[1–8] helped us to identify this specimen as *Corallodiscus lanuginosus* (Wallich ex R.Br.) B. L. Burtt. *C. lanuginosus* is a highly variable taxon and has been reported to grow in moist rock crevices at 600–3600 m amsl from northeast India to China. Recent discovery of this species from the Western Ghats[8] and the Eastern Ghats (Prasad, RRL (B), col. no. 10217), extends its distribution to peninsular India. However, contrary to the

Figure 1. *Corallodiscus lanuginosus* (Wallich ex R.Br.) B. L. Burtt (after Kamble *et al.*[8]).

claim of Kamble *et al.*[8], Haines collected *Didissandra lanuginosa* var. *minuta* from Netarhat, Bihar, which was subsequently transferred to genus *Corallodiscus* Batalin by Naithani[9]. The genus *Corallodiscus* Batalin has 18 species described from the Himalayas to northwest China[8]. However, Zheng-Yi and Raven[7] recognize 3–5 taxa in their study. The world check list for Gesneriaceae confirms five taxa under genus *Corallodiscus* Batalin, including *C. lanuginosus* var. *minuta* Naithani. Most of the species excluded were considered to be synonymous with *C. lanuginosus*, as the delimiting characters used for speciation are found to be continuous and justify a range. These variable characters are the indumentum (amount and type), lamina shape, size, margin and texture, and flower number and size. To facilitate easy identification, a description is provided here (Figure 1).

C. lanuginosus (Wallich ex R.Br.) B. L. Burtt, *Gard. Chron. Ser. 3*, 122 (3180): 212. 1947; Hara, *Fl. E. Himal. 298*. 1966. *Didymocarpus lanuginosus* Wallich ex R.Br., On Cyrtandreae 118. 1839. *Didissandra lanuginosa* C.B. Clarke in A. DC. Monogr. Phan. 5: 66. 1833; C.B. Clarke in Hook. f. *Flora Br. India* 4:355.1884.

Herb, almost stemless. Leaves radical, rosette, exstipulate, sparsely hairy above, brown woolly on veins below; deep green above, velvet greenish-white below; petiole 2.8–3 cm long, strong, sparsely long pubescent; lamina elliptic, ovate to obovate, obtuse, tapering towards base, crenate, 6.5–7 × 3.5–4 cm; palmately reticulate, veins prominent. Axillary long pedunclate lax cyme, 4–5 flowered, ca. 11 cm long, pink, hairs 1–2 mm, wavy. Flowers ca. 14 mm long, purplish-white, ebracteate, pedicels 7–9 mm long; calyx segments equal in size, sepals five, connate at base, imbricate, 2–3 × 1 mm, glabrescent, lanceolate, acute at apex; corolla tubular, purplish, ca. 12 mm long, bilipped, upper lip two-lobed, 1–2 mm long, margin reflexed, lower lip three-lobed, 3–4 mm long, woolly inside, stamens four, didynamous, epipetalous, longer ones 8–9 mm, shorter ones 4 mm, anthers dorsifixed, staminode one, 2 mm long; disc ring-like, orange; carpels 5 × 1 mm, glabrous, ovary 2 × 1 mm, unilocular, placenta-two, parietal, ovules on both sides of placenta; style 3 mm, slender, stigma bilobed; capsule glabrous, narrowly linear to elliptic, four-grooved, dehisces loculicidally; seeds minute, brown, tapering at both ends.

Flowering and fruiting: July–September.

Habitat: Grows on steep slopes in crevices of moist rocks at an altitude of 600 m.

Distribution: India (Simla, Dehradun, Sikkim, Maharashtra, Orissa, Bihar), Nepal, Bhutan, Thailand, Indo-China, Northwest China.

Specimens examined: Griffith-3835 (CAL), Smith-3345 (CAL), C.B. Clarke-7338 (CAL), Inayat-24824 (CAL), Smith and Cave-874, 822 (CAL).

Note: The present specimen completely differs in its fruit shape, arrangement of anthers and absence of bracts from those of the specimens examined. A critical taxonomical analysis is required for the taxon.

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