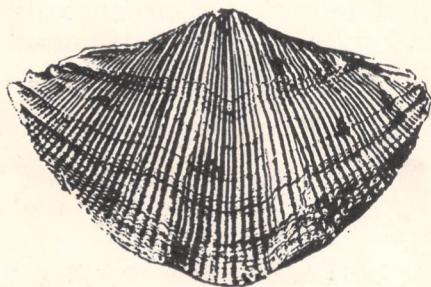


INTERNATIONAL SYMPOSIUM ON THE CARBONIFEROUS AND PERMIAN SYSTEMS IN SOUTH AMERICA



ACADEMIA BRASILEIRA DE CIÊNCIAS
INSTITUTO DE GEOCIÊNCIAS, USP
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Coal is exploited only from the 50 cm bed now exposed at surface of ground. The coal is classified as bituminous and has good coking quality, although unsatisfactory for siderurgical use, due to high percentage of organic sulphur.

The known reserve of the Tibagi Basin is calculated in 5,800,000 tons. Coal is utilised locally in a small thermoelectric plant. Table 1 below show a few analyses of coals from the two main basins in northern Paraná (Machado, 1969).

TABLE 1

Components	Coal Basins					
	Rio do Peixe			Tibagi River		
% Humidity	2.36	4.40	3.00	2.00	1.90	4.50
% Volatile matter	29.00	32.90	22.40	10.00	20.80	24.70
% Fixed Carbon	46.50	40.30	51.10	51.40	41.00	36.30
% Ash	22.14	21.90	23.50	36.60	36.30	34.50
% Sulphur	10.00	8.22	6.63	13.69	10.60	10.40
Cal. Power c/g	5,625	5,750	5,598	4,646	4,848	4,230

A great variability in the percentage of volatile matter is typical of those basins because of the coking effect of the numerous diabase dykes.

After visit the party will return to Monte Alegre for overnight stop.

FIFTH DAY — NOVEMBER 29th

Telêmaco Borba to Londrina

Guides: R. Salamuni (Instituto de Geociências, UFP)

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Road-log prepared by: A. C. Rocha-Campos, M. E. C. B. de Oliveira, P. R. dos Santos and A. R. Saad.

During the last day the excursion will continue to examine outcrops of the Tubarão and Passa Dois Groups along the road to Apucarana.

In the Telêmaco Borba area, sandstones and diamictite of the upper part of the Itararé Subgroup exhibit beautiful examples of soft sediment deformation, probably due to slumping.

Returning to the main road (BR-376), excursionists will have the opportunity to examine examples of contact relationship of diamictite and rhythmite of the Itararé Subgroup. Both transitional and sharp contacts of diamictite with underlying, or overlying rhythmite may be seen.

Other outstanding features along this road are the nice outcrops of the upper Passa Dois Group. The different facies of the Estrada Nova Formation are well exposed, with their characteristic sets of sedimentary structures. Examples of vertical recurrence of the several facies may be seen. Fossils (mesosaurids, bivalves, and fish remains) may be collected at some outcrops.

Superb exposures of the uppermost Permian unit, the Rio do Rasto Formation, with its typical red bed sequence appear climbing up the Serra do Cadeado.

Departure time: 8:00 A.M.

Km 25.1

Stop for 20 minutes.

Yellowish-gray, fine sandstone intercalated with greenish-gray siltstone and shale of the Itararé Subgroup, on the left side of the road. Sandstone forms folded masses with internal convolutions due to slumping. One hundred meters ahead, sandstone is well stratified in thick beds with well laminated zones intercalated. Current ripples and arthropod trails occur on bedding planes. Internal convolute bedding is visible in thick beds of sandstone.

Km 24.7

Stop for 20 minutes.

Yellowish and greenish-gray-diamictite of meratic sandstone intercalated with diamictite or siltstone of the Itararé Subgroup. Chaotic mixture of lithologies at the middle

part of outcrop due to soft sediment deformation. Recumbent fold of conglomeratic sandstone intercalated with diamictite and siltstone occurs 100 meters ahead (Fig. 28).

Km 0

Junction with the main road (BR-376).
Turn right (NW) to Apucarana.

Km 213.6

Bridge over the Embausinho River.

Stop for 20 minutes.

Yellowish and greenish gray-diamictite of the Itararé Subgroup overlain by rhythmite shales and sandstone at the left side. The diamictite, about 3 m thick, is non-stratified and bears numerous striated clasts. It passes by transitions upwards to rhythmite greenish-gray shale and finely stratified diamictite. Rafted clasts are common. Weathered sandstone forms the upper part of outcrop.

Km 222

Bridge over the Embausinho River.

Km 225.5-225.9

Stop for 20 minutes.

Greenish-gray diamictite overlain by rhythmite (greenish-green argillite and siltstone) with rafted pebbles. Contact between two lithologies is sharp. Upper part of section is made of diamictite and sandstone. The western part of the outcrop shows rhythmite passing transitionally to diamictite.

Km 226.0-226.1

Greenish-gray diamictite.

Km 227

Outcrop of Itararé diamictite.

Km 228

Stop for 15 minutes.

Fine to medium grained, reddish, yellowish sandstone of the Rio Bonito Formation outcropping on the right side. Sandstone is locally conglomeratic and shows good cross-bedding.



Fig. 28 — Recumbent fold of sandstone intercalated with siltstone and diamictite of the Itararé Subgroup at Telêmaco Borba, Paraná.

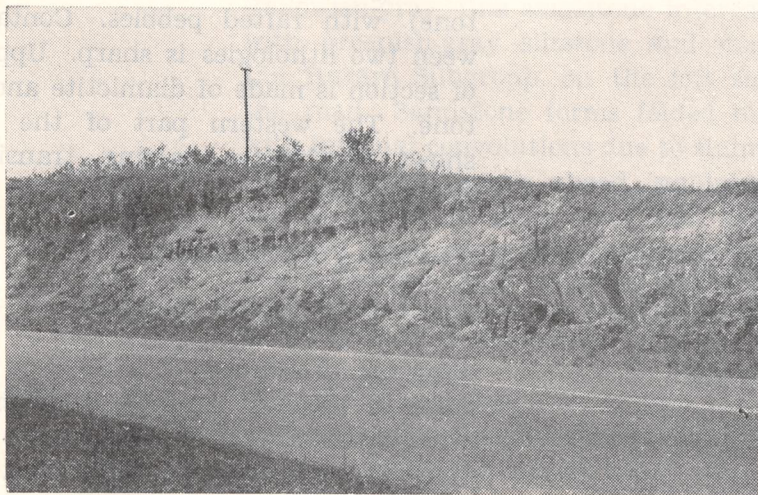


Fig. 29 — Estrada Nova Formation siltstones outcropping from km 251.8 - 252.2 of the Ponta Grossa-Apucarana road (BR-376).

- Km 235.6 Weathered shales of the Irati Formation.
- Km 237.8 **Stop for 15 minutes.**
Weathered, black, bituminous shales of the Irati Formation with remains of *Mesosaurus brasiliensis* McGregor.
- Km 247.5 Gray siltstone of the Serra Alta Formation.
- Km 247.8 Entrance to Ortigueira.
- Km 250.5 Bridge over the Formiga River.
- Km 251.8-252.2 **Stop for 40 minutes.**
Excellent outcrop of siltstone representing the Terezina facies of the Estrada Nova Formation, along at least 400 meters, on both sides of the road. Siltstone is finely stratified in millimetric to centimetric laminae. Micro cross-lamination and notable superposition of mud-cracked laminae is visible in the siltstone. Centimetric or decimetric, greenish-gray, calcareous beds intercalate and are partially silicified. Badly preserved remains of bivalves may be found in the limestone. Compare with Corumbataí Formation at Conchas (Fig. 29).
- Km 253.5 Bridge over the Barreiro River.
- Km 259.8 Transition between Terezina and Serrinha facies of the Estrada Nova Formation, both alternating in the section.
- Km 263.2 **Stop for 20 minutes.**
Siltstone or shale, bright greenish-gray, gray or violet, alternating with very fine sandstone stratified in thick massive beds, up to 2 meters in thickness. Calcareous beds intercalate in the section, showing sometimes a concretionary aspect. May yield small bivalves. Massive siltstone contains numerous fish teeth and scales. Shale or laminated siltstones are cut by numerous sandstone beds and may contain bands of clay-gall intraformational conglomerate.
- Km 267.1 First weathered outcrop of Rio do Rasto Formation, uppermost unit of the Passa Dois Group.
- Km 267.9 Bairro dos Françaes.
- Km 284.8 **Stop for 20 minutes.**
Siltstone and sandstone of the Rio do Rasto Formation on the right side of the road.

Km 286

Siltstone and sandstone are violet and gray at the base of outcrop and red at upper part, where sand beds are more common. Several small diabase dykes on eastern margin of outcrop.

Stop for 20 minutes.

Siltstone and sandstone of variegated colors belonging to the Rio do Rasto Formation. Sandstone beds are decimetric in thickness. Sandstone dykes cut the siltstone.

Bridge over the Rio Preto River.

Rio Preto.

Km 290

Km 291.1

Km 291.7

Stop for 10 minutes.

Red-maroon sandstone and siltstone of the Rio do Rasto Formation. Sandstone forms lenticular bodies showing well developed cross-bedding. Numerous sandstone dykes are intruded in the silty bands.

Km 292.6

Stop for 20 minutes.

Red-maroon sandstone and siltstone of the Rio do Rasto Formation.

Km 296.8

Red-maroon sandstone and siltstone of the Rio do Rasto Formation.

Km 298.4

Contact between the Rio do Rasto Formation and Lower Cretaceous sandstone of the Botucatu Formation at the upper part of the outcrop, on the left side of the road. An erosional unconformity separates the two units.

From this point the excursion will proceed directly to Londrina. The road ascends to the third plateau of Paraná (Cretaceous) and the rest of the outcrops belong to the Botucatu sandstone intercalated with basalt flows.

Km 359.0

Entrance to Apucarana.

Km 411

Londrina. Overnight stop.

From Londrina excursion will proceed directly to São Paulo via Ourinhos and Avaré. Excursion ends in São Paulo at Cidade Universitária. Accommodations in São Paulo for delegates returning from the excursion should be booked in advance since it is often difficult to find them at a short notice. Transportation to downtown hotels. Transportation to downtown hotels will be available.