angles (*4*) in the glycerol region are as follows: O(1)-C(1)→C(2)-O(2), 50.7°; O(2)-C(2)→C(3)-O(3), 76.5°; C(1)-C(2)→C(3)-O(3), − 116.9°; O(1)-C(1)→C(2)-C(3), 61.0°.

The molecules of **1** pack in a layered structure with the bromine atoms at the tail ends and the *p*-toluenesulfonate group at the head end. The layers are packed tail to tail and head to head. Two layers packed tail to tail form a bilayer similar to that of many membrane model systems (*5*).

In similar compounds (*6*) containing ω-bromine atoms in the terminal positions, the bromine atoms pack in well-defined end group planes. In **1**, the bromine atoms do not form as clearly a defined end group plane, but rather interdigitate slightly in the chain terminus packing scheme. The head group bulk is important in determining molecular packing across the head to head packing plane.

Compound **1** is a sulfolipid having the size and shape of a saturated lecithin or cephalin; however, it lacks a zwitterionic charge in the head group. None of the phospholipid structures have yet been determined by single crystal methods. The present results have a direct bearing upon the molecular structures of the phospholipids.

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$$R = (\Sigma||F_{obs}| - |F_{calc}||)/(\Sigma|F_{obs}|)$$

where *F* is the structure factor.
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Iron-Rich Basal Sediments from the Eastern Equatorial Pacific: Leg 16, Deep Sea Drilling Project

Abstract. *Iron-rich sediments chemically similar to those forming at present on the crest of the East Pacific Rise have been found just above basement at widely separated drill sites in the eastern equatorial Pacific, including three sites of Leg 16 of the Deep Sea Drilling Project. These sediments were probably formed when the basement was at the crest of this rise and have moved to their present location as a result of sea-floor spreading.*

The program for Leg 16 of the Deep Sea Drilling Project (DSDP) was designed around three principal objectives: (i) an examination of the tectonic and depositional history of the Panama Basin, (ii) supplementary drilling for the study of the Cenozoic depositional history of the eastern equatorial Pacific, and (iii) a search for Fe-rich sediments directly above basement similar to those found previously by drilling in the eastern equatorial Pacific. In connection with the first objective, DSDP sites 155 through 158 were drilled on shallow ridges surrounding the Panama Basin (*1*); DSDP sites 159 through 163 were drilled to supplement a north-south traverse of drill sites along 140°W which was begun on Legs 5 and 8, and to add to the network of equatorial drill sites extending across the eastern and central Pacific. The evaluation of these aspects of Leg 16 results awaits publication of the results of earlier legs.

In addition, the Leg 16 sites were designed to test the distribution of ferruginous sediments that have been reported immediately overlying basement at several sites of Legs 5 and 9 (*2*). These deposits may be analogous to the iron-rich sediments now forming on the crest of the East Pacific Rise. Similar deposits were found at sites 159 through 162 in the area between the discoveries of Legs 5 and 9 to the north and south, respectively. We present here the results of some analyses of these deposits and a preliminary discussion of their origin.

The basal sediments of sites 159 through 163 consist predominantly of clays and chalk oozes. At both site 159 and site 160 a thin basal clay unit may be present, but it is difficult to be sure since an undisturbed contact between basalt and the overlying sediments was not recovered. The lowermost core from each of these sites consists of slurried carbonate, clay, and basalt chips, whereas the deepest sediment preserved in a reasonably undisturbed state is a nannofossil chalk ooze. At site 161 the basal sediment is a locally calcareous indurated

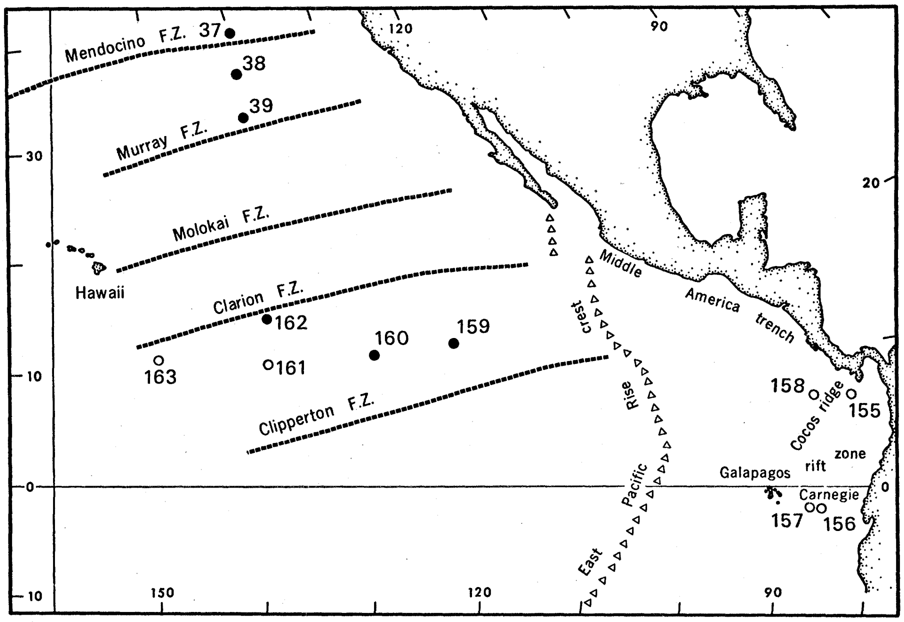

Fig. 1. Location of Leg 16 drill sites of the DSDP in the eastern equatorial Pacific (sites 155 through 163). Solid circles are sites at which sediments enriched in Fe and trace metals were recovered immediately above basement. Also shown are sites 37 through 39 of Leg 5 at which similar deposits were encountered; *F.Z.*, fracture zone.

Table. 1. Composition of basal sediments collected during DSDP Leg 16. Site 159, 12°20′N, 122°17′W; site 160, 11°42′N, 130°53′W; site 161A, 10°40′N, 139°57′W; and site 162, 14°52′N, 140°03′W; ppm, parts per million.

Site	Core	Section	Interval (cm)	Depth below sea floor (m)	Distance above basalt (m)	Fe (% by weight)	Mn (% by weight)	Ni (ppm)	Co (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Stratigraphic age	Lithology
159	2	1	38– 43	9	99	4.74	0.72	336	183	816	40	219	Late Miocene	Radiolarian clay
159	10	6	90– 95	89	19	18.27	4.60	438	78	1044	130	443	Early Miocene	Nannofossil marl
159	12	1	25– 30	99	9	16.77	4.48	472	76	762	122	427	Early Miocene	Nannofossil marl
159	12	6	103–108	107	1	19.10	5.15	496	95	840	152	458	Early Miocene	Nannofossil marl
159	13	2	95–100	107	1	15.96	3.56	385	79	611	106	518	Early Miocene	Nannofossil marl
159	13	4	133–137	108	0	15.96	3.16	345	79	744	106	438	Early Miocene	Nannofossil marl
160	3	4	78– 83	23	86	6.42	1.10	187	64	749	42	230	Early Miocene	Zeolitic clay
160	10	6	125–130	90	19	2.06	0.36	243	121	364	304	206	Early Oligocene	Nannofossil chalk ooze
160	11	6	135–140	99	10	2.29	0.36	241	120	362	302	205	Early Oligocene	Nannofossil chalk ooze
160	12	5	135–140	106	3	3.09	0.35	158	71	431	179	179	Early Oligocene	Nannofossil chalk ooze
160	13	1	99–103	109	0	8.52	1.86	994	56	994	56	262	Early Oligocene	Nannofossil marl
161A	12	1	59– 64	218	26	5.94	1.04	113	27	475	34	183	Late Eocene	Radiolarian ooze
161A	12	1	139–144	219	25	6.48	1.09	108	27	536	37	189	Late Eocene	Radiolarian ooze
161A	13	1	136–141	227	17	3.91	0.84	61	20	350	29	95	Late Eocene	Radiolarian ooze
161A	14	1	148–150	236	8	4.74	1.10	169	33	508	58	183	Middle Eocene	Radiolarian ooze
161A	14	2	149–151	238	6	4.48	0.92	105	17	402	34	149	Middle Eocene	Radiolarian ooze
162	12	2	104–109	102	51	6.04	0.63	56	12	226	31	126	Middle Eocene	Clayey marl ooze
162	16	3	76– 81	138	25	3.87	1.03	86	15	244	28	91	Middle Eocene	Clayey radiolarian ooze
162	17	1	62– 67	145	8	19.42	7.10	488	99	1498	149	33	Middle Eocene	Ferruginous clay
162	17	4	101–106	150	3	30.56	9.55	1680	171	1814	229	515	Middle Eocene	Clayey marl
Average of 11 ferruginous sediments from sites 159, 160, and 162						17.50	4.52	535	83	917	145	358		
Average of carbonate-free surface cores from the East Pacific Rise, 12° to 14°S (*6*)						18.00	6.00	430	105	730		380		
Average surface Pacific pelagic clay (*10*)						5.06	0.48	211	101	323	68			

radiolarian ooze, at site 162 a zeolitic brown clay overlying a foraminiferal nannofossil chalk, and at site 163 a slightly dolomitized chalk. All these sediments, other than those at site 163, contain a relatively high proportion of small yellow to reddish-brown amorphous ferruginous aggregates, grains, and globules. These are as large as a few tens of micrometers in diameter and are generally spherical. They are also found, usually in low concentrations, elsewhere in the sediment column at each of the sites, but are most abundant in basal sediments.

Eighteen samples of basal and near basal sediments from sites 159 through 162 were selected for analysis, together with two shallower samples from sites 159 and 160 for comparison. The elements Fe, Mn, Ni, Co, Cu, Pb, and Zn were determined by standard atomic absorption spectrophotometric techniques (*3*) after digestion in aqua regia. The results are presented on a carbonate-free basis in Table 1.

The data show that the basal sediments at sites 159 and 162 are markedly more ferruginous than those higher in the sediment column, whereas only a slight basal enrichment of Fe occurs at site 160 (Table 1). Smear-slides of these samples contain high concentrations of the yellow to reddish-brown grains mentioned above. The apparent lack of basal Fe enrichment at site 161 may reflect dilution by opaline silica, since ferruginous grains are common here also. Recalculation of the analyses on a biogenous silica-free basis would reveal an enrichment similar to those in the other cores, since the opal content of sediment in section 1 of core 14, for example, is 65 to 70 percent (by weight).

Elements other than Fe are also enriched in the basal sediments from sites 159, 160, and 162, Manganese is concentrated severalfold at the base of the sediments at sites 159 and 162 relative to its abundance higher in these sections, whereas Zn, Ni, Cu, Co, and Pb are concentrated in some, but not all, of the ferruginous sediments (Table 1).

Metal-rich recent sediments from the crests of mid-oceanic ridges are well documented (*4*), but it is only with the advent of the deep-drilling techniques of the Deep Sea Drilling Project that such sediments have been found in older subsurface formations. The basal sediments analyzed in this work range in age from early Miocene at site 159 to middle Eocene at site

162, and are very similar in composition to recent sediments at the crest of the East Pacific Rise. Boström (*5*) has reported Fe concentrations in excess of 20 percent on a carbonate-free basis in East Pacific Rise deposits, and Boström and Peterson (*6*) have found that these sediments contain concentrations of Mn, Cu, Zn, Ni, and Co similar to those occurring in the sediments described here (Table 1). The high metal concentrations in East Pacific Rise sediments are thought by Boström (*5*) to result from submarine hydrothermal activity associated with the generation of new ocean floor at the rise crest. Corliss (*7*) has proposed that these hydrothermal solutions originated by the leaching of the newly extruded basalt. However, Turekian and Bertine (*8*) have suggested that some metal enrichments in ocean ridge sediments may result from their deposition under anaerobic conditions. Such a mechanism is unlikely to apply to the sediments described in this report, since they are oxidized throughout and contain the bulk of their Fe in the ferric state. In any event, according to current theories of sea-floor spreading, new ocean floor moves away from ridge crests, thereby carrying away sediment deposited on it irrespective of its origin. The ferruginous sediments described here are probably the Tertiary equivalents of those forming at the crest of the East Pacific Rise at the present time (*9*).

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Alpha$_1$ Antitrypsin in the Livers of Patients with Emphysema

Abstract. *Parenchymal liver cells from emphysema patients with an inherited deficiency of α_1-antitrypsin contain globules of glycoprotein that bind fluorescent antibody to α_1-antitrypsin. The globules can be seen after hematoxylin and eosin-staining or on electron microscopy, but are more readily demonstrated by PAS stain of amylase-treated liver sections. It appears that an inappropriately large amount of α_1-antitrypsin is found in the liver even when there is a deficiency in the serum. Genetic variants of the normal antitrypsin molecule may be unable to leave their site of synthesis in the liver cell because of some molecular aberration.*

Individuals with an inherited deficiency of α_1-antitrypsin (A_1AT) in their serums are predisposed to the development of pulmonary emphysema (*1, 2*). The concentration of A_1AT in the blood is controlled by alleles of a pair of codominant genes that produce variants of the normal antitrypsin molecule (Pi system) (*3*). Certain variants are associated with a reduced concentration of A_1AT and a parallel reduction of its activity in serum (*4*). Thus, a deficiency of A_1AT results from its reduced concentration rather than from reduced activity of the antitrypsin variant.

Alpha$_1$-antitrypsin is synthesized primarily by the liver (*5*) but no consistent abnormality of liver structure or function has been described in genetically deficient subjects with lung disease (*6*). However, instances of inherited infantile cirrhosis of the liver have been observed in children with severe antitrypsin deficiency associated with the Pi^{ZZ} homozygous state (*7, 8*).

Sharp *et al.*, using both light and electron microscopy examined the livers of such children and described parenchymal liver cells containing unusual globules whose contents were antigenically related to A_1AT (*9*). Their observation suggests that the deficiency in these children may be related to an abnormality of hepatic storage or release of the A_1AT. Our study was undertaken to determine whether abnormal quantities of A_1AT are also present in the livers of adults with pulmonary emphysema and antitrypsin deficiency.

Liver tissue was obtained from ten patients by percutaneous liver biopsy and from four patients at autopsy. Eight of these specimens were from patients with a severe deficiency of A_1AT due to Pi^{ZZ} phenotype [less than 0.4 unit (milligrams of trypsin inhibited by 1 ml serum)] and six were from patients with an intermediate deficiency (one Pi^{SS}, four Pi^{MZ}; their activity was 0.4 to 0.85 unit). All 14 patients had lung disease, but only one patient had evidence of liver disease related to metastatic carcinoma. None of the other 13 patients had clinical or laboratory evidence of liver disease.

Tissues were prepared for microscopy as follows. (i) The liver tissues were fixed in formalin, embedded in paraffin and stained with hematoxylin and eosin (HE) or with periodic acid schiff (PAS) reagent both before and after digestion with alpha amylase. (ii) Alternatively they were fixed in 2.5 percent glutaraldehyde in cacodylate at *p*H 7.4 followed by fixation in 1.0 percent osmic acid in barbital-acetate buffer, *p*H 7.4; such preparations were prestained with 0.5 percent uranyl acetate, dehydrated in acetone, and embedded in Epon. Ul-