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NEW OCCURRENCES OF JAROSITE IN VIRGINIA

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Jarosite, thought to be a relatively uncommon mineral in the Eastern United States, has recently been observed in considerable quantities associated with a glauconite-rich sandstone in the Nanjemoy formation (Eocene) in Virginia. Large amounts occur along the south bank of the Potomac River, near the old Woodstock estate, above Mathias Point in King George County. It also occurs in similar sediments on the south bank of the Rappahannock River between Moss Neck and Skinker's Neck in Caroline County. Although the mineral has been collected only from these two localities, it probably exists wherever the Nanjemoy, and similar formations, outcrop in Virginia and in neighboring Maryland.

The jarosite occurs as pulverulent, light-yellow impregnations, small pellets, and thin crusts (about 1 mm thick) associated with a buff to gray friable glauconite-rich sandstone. It was identified by the x-ray powder method and a semiquantitative spectrographic analysis. The indexed x-ray powder data, which compare favorably with other published data (Warshaw, 1956), are given in Table 1. These represent average values from six films made in two cameras of 11.46 cm diameter, using both CuK_α and FeK_α radiation. Unit cell values are a_o = 7.32 Å, c_o = 17.18 Å; $a_o : c_o$ = 1 : 2.347. Intermixed impurity quartz was detected in most samples by its powder lines at 4.26 Å and 3.34 Å. The presence of quartz was also indicated by the semiquantitative spectrographic

analysis. This analysis showed that the major cations are K and Fe, and that trace elements, listed according to decreasing amounts, include Na, Al, Ca, Mg, Ti, V, Sr, Sn, Mo, Cr, Cu, and Ba. Kulp and Adler (1950) have indicated that Na, Ca, Sr, and Ba may substitute for K, and Al and Cr may substitute for Fe in jarosite, $KFe_3(SO_4)_2(OH)_6$. The jarosite is so fine-grained that useful optical data were not obtained. The very fine-grained condition of the material was also indicated by the somewhat diffuse nature of the x-ray powder lines.

Of the two localities noted, only the one at Mathias Point will be described here. The one near Skinker's Neck is much overgrown and not very accessible, however superficially it appears to be nearly identical. Near Mathias Point the jarosite occurs throughout the entire Nanjemoy exposure which is over 25 feet thick and at least a mile long. The formation, already discussed in detail by Gildersleeve (1939, 1942), is a buff to gray poorly-indurated argillaceous sandstone, containing much glauconite, quartz, and white mica. In earlier descriptions the yellow jarosite in the sandstone was mistakenly called "iron oxide" or "limonite". Occasionally small amounts of brown limonite do occur as stains intimately associated with the yellow jarosite, and probably represent oxidation of it. Selenite gypsum cyrstals, in clusters up to five inches across, similar to those described by Gildersleeve (1931a) in the Nanjemoy at River Tie Warf northwest of Port Royal, Virginia, occur in the formation. Often jarosite stains the sandstone where it is in direct contact

with the gypsum. Fossil shell fragments and calcareous concretions are also in the formation. Vivianite, also reported from the same locality (Gildersleeve, 1931b), was not noted by the writer.

The jarosite was probably formed through near-surface weathering processes involving the reaction of sulfate-bearing solutions, probably a result of the oxidation of pyrite, with glauconite (and perhaps mica). The sulfate solutions also probably formed gypsum by reaction with the calcareous matter in the formation. No pyrite is now observed in these highly weathered sediments. Similar ideas for the formation of jarosite have been proposed by Tyler (1936) and Briggs (1951) for other localities where it is closely associated with glauconite: Glenwood horizon, St. Peter sandstone (Ordovician), Wisconsin (Tyler, 1936); Eocene beds about 10 miles south of Los Banos, California (Briggs, 1951); Temblader formation (Cretaceous), Greater Oficina area, Venezuela (Warshaw, 1956).

Jarosite has previously been reported in Virginia at an old limonite mine about one mile southeast of Midvale, Rockbridge County (Gordon, 1925). Here it occurs as minute brownish-red crystals in rockbridgeite veins in brecciated ferruginous sandstone. Until now this has been one of the few well-known localities in the Eastern United States. With the discovery of jarosite in the Virginia Eocene, the writer feels that jarosite is probably quite common in the East, and has been overlooked until now because of its similarity to limonite.

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Table 1. X-ray Powder Data on Jarosite from the Virginia Eocene

hk.ℓ	$d_{(obs.)}$ A	$I_{(obs.)}$
10.1	5.92	w
00.3	5.71	w
01.2	5.10	s-
11.0	3.66	vw
02.1, 11.3	3.09	vs
20.2	2.96	vw
00.6	2.86	w
02.4	2.55	w
10.7	2.29	m
30.3	1.98	w
00.9	1.91	vvw
22.0	1.83	w-
22.6	1.54	vw
02.10	1.51	vw