TECHNICAL PAPERS

The Polished Rocks of Cornudas Mountain, New Mexico

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In 1941 (*1*) I presented my recollections and inferences concerning certain polished surfaces I had noticed on the porphyritic rocks of the Hueco and Cornudas Mountains in Texas and New Mexico. Lately I had opportunity to give more than casual attention to the appearance and relation of the polished surfaces to the rocks on which they are found about Cornudas Mountain.

Both Cornudas Mountain and the Hueco Tanks, which lie along the western Texas and New Mexico boundary and are about 35 miles apart, are plugs or laccolithic intrusions injected into Permian strata from the same igneous magma. The rock is a porphyritic syenite composed of potash feldspar with a small amount of plagioclase, and hornblende, amphibole, biotite, and magnetite. Fresh specimens of the rock range in color from a faint pink to a pale gray, depending on the inherent color of the feldspar. Weathering of the rock frees iron from the ferromagnesian minerals, and a coating of hydrous iron is formed over the weathered surface of the rock which imparts to it a dark reddish-brown color and causes the mountain to glisten in the sun like copper-bronze.

The natural rupture of the rock, either by fracture or spalling, produces a roughened, hackly surface. The fracture tends to pass around rather than through the phenocrysts of feldspar. Thus, the feldspars commonly stand out as much as an eighth of an inch or more above the general level of the rock surface. Spotted over this natural roughened surface of the rock are occasionally to be found highly polished areas. These polished surfaces were seen only on the southeast side of Cornudas Mountain and only within a relatively narrow zone where the coarse rock talus at the base of the cliffs meets the detrital apron. Some enormous blocks of rock have fallen from the cliffs and tumbled out to isolated positions on this surrounding and flat-lying detrital apron. Most of these boulders show some evidence of polish.

Often within the center of a polished area covering 5 to 25 square feet of rock there are no irregularities—only a smooth, glassy surface. This highly polished surface grades outward into a normal rough rock surface through a marginal zone wherein the phenocrysts stand out like rounded and polished cameo buttons in a rough, granular, intaglio background. Thus, a gradation in the state of perfection of the polish is displayed. In the marginal zone the projections of the phenocrysts are progressively less rounded off outward, and the depressions have received no polish where the higher protrusions are not well worn down. It is evident that the polish is due to lapping by a flexible medium which was capable of following to some degree the irregularities of the original surface and thus extending the buffing process somewhat into the recessed parts of the surface. Only one agency is likely to have produced such an effect upon these rocks: It is a common habit for grazing animals to choose certain places to scratch their hides. The hides of animals contain oily matter, and this, when combined with the fine dust which animals habitually toss upon themselves, forms an effective abrasive capable of wearing away rock and producing a high polish.

An examination in section of the polished surface shows a thin discoloration band, extending an average of $\frac{1}{60}$ inch in depth, which is apparently due to absorption of animal fat. It is different in appearance from that due to the staining by hydrates of iron. To determine the presence of oil or fat, a piece of the rock having 4 square inches of polished surface was submitted to W. W. Brannock, of the Chemical Laboratory, Geological Survey, for test. The material was treated with carbon bisulfide after being broken into coarse fragments, and the solvent was evaporated in a porcelain dish. For even so small an area of polished surface as that borne by this piece of rock a very sizable spot of honey-yellow oily matter remained on the porcelain dish. A blank test of the carbon bisulfide proved that oily matter had been extracted from the rock. The associated brown stain was also chemically proved to be an iron compound.

Under low-power magnification a shriveled coating of an amber-colored substance was repeatedly observed on the surface of the highly polished feldspar phenocrysts. This material had the appearance of a dried-out oil film, but both flame and heat tests failed to show any expected results. The material proved refractory. Microscopic examination disclosed that it is isotropic and is silica in the form of opal. From these facts it is deduced that the fine silica dust mixed with oily fats was rubbed on the surface of the rocks by animals, and that in the decades, if not centuries, of exposure to the elements since the last animal used the rock for a rubbing post, the silica weathered to opal, and the oil gradually vanished from the surface film. As the oil distilled away in the heat of the sun, the film shrank, and the residuum of opal formed a shriveled and mummified skin on the face of the feldspar phenocrysts.

These few facts seem convincing evidence that the polished surfaces of rock about Cornudas Mountain are of animal origin.

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Vitamin C Content of Mexican Ornamental Plants

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It is known that the leaves or flowers of certain inedible ornamental plants are very rich in vitamin C: 600 mg./100 grams fresh substance in the lily (*1*); more than 10,000 mg./100 grams dry substance in gladioli (*7*); 900 mg./100 grams fresh substance (*5*) or 6,000 mg./100 grams dry substance (*2*) in *Primula officinalis;* and lesser quantities in other flowers (*4, 6*).

The extraction of vitamin C from gladioli has been included in the subject matter of industrial patents (*8*).

As a contribution to the knowledge of the distribution of vitamin C in inedible plants, we have determined its content in ornamental Mexican plants, by the colorimetric method, using 2,6-dichlorophenol indophenol, determining in each case ascorbic acid alone and the total ascorbic acid plus dehydroascorbic acid by the usual method of reduction with H_2S after precipitating with mercuric acetate (*3*).

In each case we have indicated the part of the plant analyzed and the month in which it was collected. We have determined also the per cent of total solids and have recalculated the two values found in each case to the dry basis.

All the plants selected are ornamental flowers common in Mexico, D. F., and were analyzed the same day they were gathered. The results obtained are reported in Table 1.

TABLE 1

Botanical name	English name	Part of plant	Month gathered	Fresh substance: Ascorbic acid (mg./100 grams)	Fresh substance: Ascorbic acid + dehydro-ascorbic acid (mg./100 grams)	Total solids (%)	Dry substance: Ascorbic acid (mg./100 grams)	Dry substance: Ascorbic acid + dehydro-ascorbic acid (mg./100 grams)
Althaearosea	Hollyhock	Petals	June	64.6	73.3	18.7	344.3	391.9
Bellis perennis	True or English daisy	"	May	37.4	40.4	14.9	251.0	271.1
Bouvardia longiflora		"	June	90.3	91.7	11.5	785.2	797.3
Centaurea Cyanus	Cornflower or bachelor's-button	"	May	79.5	81.2	16.7	476.0	486.2
Dianthus Caryophyllus	White carnation or clove pink	"	April	126.4	131.5	16.0	790.0	821.8
	Red carnation or clove pink	"	"		136.2	15.6		873.0
Gardenia augusta	Gardenia	"	June	49.0	59.4	17.0	288.2	349.4
		Leaves	"	135.5	143.0	34.8	389.3	410.9
Gladiolus byzantinus	Gladiolus, white	Petals	"	118.3	122.0	6.3	1,877.7	1,936.5
		Leaves	"	52.8	55.8	27.9	189.2	200.0
		Stalks	"	134.0	135.2	14.7	911.5	919.7
Hydrangea Hortensia	Hydrangea	Petals	"	36.4	44.2	23.9	152.3	184.9
		Leaves	"	27.3	34.3	13.9	196.4	246.7
Lathyrus odoratus	Sweet pea, white	Petals	May	72.9	74.4	13.6	536.0	547.0
Lilium candidum	Madonna lily	"	"	45.6	50.5	8.4	542.8	601.2
		Leaves	"	53.4	55.3	13.2	404.5	418.9
		Stalks	"	29.7	34.1	15.4	192.8	221.4
Philadelphus mexicanus	Mock-orange	Petals	"	35.7	37.1	12.9	276.7	287.6
Rosa centifolia	Cabbage rose, white	"	"	64.9	75.4	17.4	372.9	433.3
		Leaves	"	11.4	17.1	32.0	35.6	53.4
Rosa fragans	Tea rose	Petals	June	91.2	106.6	17.2	530.2	619.8
Zantedeschia aethiopica	Calla lily	"	April	90.8	97.6	13.4	677.6	728.3
		Leaves	"	109.4	113.0	20.2	541.5	559.4
		Stalks	"	11.1	15.6	6.3	176.2	247.6

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