H. Crookshank (1938, p. 101) had taken a few traverses in the area, and a brief account is given in the General Report of the Geological Survey of India for the year 1938. He recorded that the Kanker-Sihawa country, as well as the northern portion of Bastar, south of Kanker, is a coarse, usually binary rock, with little or no sign of foliation. He has considered these rocks to be older than the rocks of the Bailadila Series.

Petrography.—The host rock shows porphyritic texture and is essentially composed of quartz, orthoclase, oligoclase and plenty of green biotite. The orthoclase is highly kaolinised, while oligoclase is moderately altered. A few crystals of andesine were also noticed. Biotite occurs as clusters and shows alteration to chlorite at a few places with liberation of secondary sphene. Pink epidote, primary sphene and apatite occur as accessory minerals.

The phenocryst is composed of perthitic microcline, which exhibits microperthitic intergrowth of potash (microcline) and sodic (albite and oligoclase) felspars. Further the potash felspar is highly kaolinised. The phenocryst is surrounded by a rim of fine grained myrmekitic assemblage of albite and oligoclase felspars.

With higher percentage of alkali felspars, the rock can be classified as adamellite and the texture described as "Rapakivi Texture", because of the occurrence of ovoid phenocrysts of alkali felspar encased in shells of oligoclase. This texture is very common in the basified portions of granites. In some cases, the rapakivi texture seems to result from simultaneous crystallisation of alkali felspar with plagioclase under the influence of volatiles, and in still others the oligoclase mantles may be derived by migration of sodic material unmixed in the formation of perthite (Williams, Turner and Gilbert, 1965).

The above rock showing the Rapakivi Texture compares well with the famous "Shap Granite" of Westmorland, England, which has been identified as adamellite. An interesting feature of this "Shap Adamellite", especially in its early basic phases, is the presence of oligoclase mantles around some of the orthoclase phenocrysts. Ramkrishnan *et al.* (1969) have reported the occurrence of amphibolitic rocks comprising hornblende, plagioclase (oligoclase-andesine range), quartz biotite, apatite, magnetite, etc., and granulites with hypersthene, diopside, augite and plagioclase with minor amounts of quartz and biotite in Jagdalpur and Kondagaon *Tehsils* of Bastar District. Rocks of amphibolite facies consisting of the assemblage of plagioclase-hornblende-diopside are likely to be the parent rock with andesitic composition when biotite and quartz are also present (Williams, Turner and Gilbert, 1965). The resultant Rapakivi Texture is attributed to basification of partly crystallised magma by the assimilation of andesitic wall rock, and this might also be attributable in the present case as well.

Central Ground
Water Board,
Nagpur,
November 27, 1972.

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RELEASE OF PHOSPHATE FROM TRICALCIUM AND ROCK PHOSPHATES BY ORGANIC ACIDS

AVAILABLE phosphorus in soil is seldom sufficient for optimum growth, and grain yield of crops, where no phosphatic fertilizers are applied. The application of organic matter and humus to soil improves the availability of phosphorus to plants[1-3]. Both phenolic and aliphatic acids are regularly produced in soil due to microbiological breakdown of organic materials[4] and solubilize insoluble phosphates[5,6]. Bardiya[7] obtained maximum rock phosphate solubilization by oxalic acid. This communication deals with the extent of solubilization of rock phosphate and tricalcium phosphate by organic acids identified in soil incubated with different organic residues[4].

Weighed quantities of Mussorie rock phosphate and tricalcium phosphate containing 10·9 mg P were transferred to 250 ml conical flasks in duplicate, and to these, 50 mg organic acid and 25 ml distilled water were added. The flasks were shaken for 24 hr on rotary shaker (180 r.p.m.). The pH of the suspension was determined before and after shaking. After 24 hr shaking, the contents of flasks were centrifuged at 15,000 r.p.m. for 30 min. The quantity of water soluble phosphorus in suitable aliquot was determined colorimetrically[8].

The results (Table I) show that among the phenolic acids, phthalic acid, a dicarboxylic acid, solubilized maximum quantity of phosphorus and increased water soluble phosphates from tricalcium phosphate and rock phosphate by 4 and 18 folds over control respectively. It was followed by

salicylic, *p*-hydroxybenzoic, vanillic, protocatechuic, syringic, pyrogallic, benzoic, *p*-coumaric and cinnamic acids respectively in decreasing order. Humic acid and glycine were less effective.

TABLE I

Release of phosphorus from tricalcium phosphate and rock phosphate due to action of organic acids

Acid	Tricalcium phosphate		Rock phosphate	
	pH	µg/25 ml	pH	µg/25 ml
Control ..	6·9	162·5	7·1	37·5
Citric ..	4·5	950·0	3·5	737·5
Fumaric ..	4·4	1000·0	4·0	850·0
p-Coumaric ..	5·5	375·0	4·5	100·0
p-Hydroxybenzoic	5·2	780·0	4·2	281·2
Salicylic ..	4·8	800·0	4·2	281·2
Vanillic ..	5·3	762·0	4·2	212·5
Protocatechuic ..	5·2	725·0	4·3	212·5
Benzoic ..	5·1	462·5	4·2	125·0
Phthalic ..	4·8	864·5	4·1	650·0
Pyrogallic ..	5·7	562·5	5·2	131·2
Syringic ..	5·2	746·2	4·7	200·0
Cinnamic ..	7·0	187·5	4·5	787·2
Glycine ..	4·2	375·0	4·4	275·0
Humic ..	6·2	175·0	6·0	87·5
EDTA ..	5·1	1625·0	4·7	1550·0

Aliphatic acids were comparatively more effective in solubilization of phosphates than phenolic acids. Fumaric and citric acids showed about 5 folds increase with tricalcium phosphate and about 22 and 19 folds increase with rock phosphate respectively. Johnston[5] demonstrated that hydroxy acid and tri and dicarboxylic acids were good tricalcium phosphate solubilizers. It was further reported that dibasic aromatic acids were good chelating agents but monobasic aromatic acids did not show any appreciable chelating property. EDTA which was included in the study for comparison showed the best results.

It is concluded that phenolic acids as compared to aliphatic acids were less effective in phosphate solubilization. This is due to the presence of higher number of carboxylic groups in case of citric and fumaric acids. Phthalic acid dicarboxylic acid) and *o*-hydroxybenzoic acid (salicylic acid) were comparatively more effective in this regard than other phenolic acids. More phosphorus was released from tricalcium phosphate than rock phosphate.

Division of Microbiology, I.A.R.I., New Delhi,
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ISOLATION OF A NEPHROTOXIN FROM *PENICILLIUM PICEUM*, A COMMON FOOD CONTAMINANT*

SEVERAL species of *Penicillium* isolated from corn have been reported to be toxic to mice and rats[1,2]. The toxic nature of few other *Penicillium* species have also been reported from this laboratory[3-5]. Krogh and Hasselager[6] have suggested that the nephrosis prevalent in pigs in Denmark may be due to the intake of some *Penicillium* contaminated feeds. We report here the identification and partial purification of a nephrotoxin from *Penicillium piceum*, found as a common food contaminant in stored foods. Both chicks (White Leghorn, one-day old) and mice (Swiss albino, weighing 20–25 g) were used in our experiments.

The organism, *Penicillium piceum*, was grown at room temperature in Czapek's Dox medium for twenty days. Two litres of the culture filtrate was filtered through cotton and Seitz filter and concentrated to about a twentieth of its original volume under vacuum. 1 ml of this concentrate was mixed with 5 g of sterilised commercial diet (Hindliver) and fed to the experimental mice. 100 ml of the concentrate was extracted with chloroform in a reciprocating shaker. The chloroform extract, after separation, was dried and taken in water. One ml of this fraction was fed to another group of animals.

A hundred per cent mortality was observed in chicks within 2–3 feedings of either the culture filtrate or the chloroform extract. Histological examination revealed mild hepatic and severe kidney damage in mice. Accumulation of lymphocytes and focal nephritis around blood vessels along with round cell infiltration were the changes noted. These changes were observed in mice fed with either of the fractions. Chicks and mice reared on uninfected diets looked perfectly normal and their liver and kidney sections showed normal picture.

In an attempt to purify the nephrotoxic fraction, the chloroform extract was resolved on thin layer chromatography. (Silica gel-adsorbent; Toluene: