State Department of Geology and Mineral Industries

702 Woodlark Building
Portland 5, Oregon

UPPER PIKE CREEK RADIOACTIVE AREA

Harney County

Foreword: This report summarizes the information available on the new area staked by Davis, Quier and Kronberg up Pike Creek, an estimated 2½ miles from the former discoveries owned by Davis, Quier and leased by United Uranium Company.

Location: Given by Davis as T. 34 S., R. 33 E., section unknown. According to U.S.G.S. Bulletin 995, Plate 8, a geologic map with a township plat put in by triangulation on aerial photos, the branch in Pike Creek near the claims appears to lie in sec. 18, T. 34 S., R. 34 E., the same township as the previous claims. This is entered merely as a point of information. This section of the state is notably lacking in survey points. The first branch from the mouth of Pike Creek is on a staked area.

The claims are in SE Harney County approximately 3 miles south of Alvord Ranch.

Ownership: 8 claims have been staked under the names of Harold Davis, Dewey M. Quier and Lee Kronberg. The claims are called Lobo 1-5, Buckhorn and Flicker 1 and 2.

Geology: According to U.S.G.S. Bulletin 995, the new area is in the Pike Creek volcanic series and is probably in the biotite dacite flows with interbedded tuff. The prospects appear to be in the lower part of this unit.

The Pike Creek series of early Pliocene is a series of rhyolite and dacite flows and tuffs.

Several interesting facts were noted. The intrusion (dike) which forms one wall of the uranium occurrence described by Corcoran and Wagner

(DOGAMI file reports Sept. and Nov., 1955) continues across the creek in a fairly straight line. This dike appears to be overlain by continuous tuffs. Further up the creek, between the two uranium occurrences, a dike appears to have intruded the Pike Creek series and has bowed up an overlying flow or tuff bed. Bedding is continuous above this dike. Also noted were dark volcanic rocks, pitchstones and intermediate to basic flow rocks which appear on the canyon walls. It is thought that these could be either sills or possibly remnants of later intra-canyon flows. It appears that there may be several acid vents along Pike Creek.

Geology of Uranium Occurrences: The uranium occurrences are in biotite dacite. The "hottest" spots tested by a Precision Geiger counter, which was calibrated a little low (possibly 10%), was along iron-manganese oxide stained fractures. The best readings obtained were 0.2 mr/hr.

The rock masses are either dikes or flows. Overburden made exact relations difficult. However, it is believed that the masses are flows.

The bodies tested had a high background count. Readings on the Geiger counter were continually in the 0.1 mr/hr range. The iron and manganese oxides in joints and shears in the rock were the best, however.

The source of the radioactivity is not known. Although fluorescent material is present on stained fractures, this does not appear to be responsible for any appreciable amount of radioactivity. It is thought that the uranium present is present as a primary constituent of the rock. Along shears and joints the circulation of ground water has leached uranium from the rock and has deposited this uranium along with iron and manganese oxides and hydroxides.

If the deposit is hydrothermal, the hard non-porous rocks tested do not appear to be favorable hosts for mineralizing solutions. The only chance for an economic mineral deposit would be the presence of more permeable tuffs underlying the hard flows. It is the writer's opinion, however, that this occurrence is not strictly a hydrothermal deposit.

Economics: Several miles of very expensive road would be needed to reach the deposit. No surface exposures are nearly good enough to mine.

Assays: Three samples of the best material available assayed 0.04, 0.06 and 0.06% equivalent uranium on the Department's radioassayer. Sample QG-143, P-19781, one of the 0.06% equivalent uranium samples was assayed chemically and contained 0.05% U_3O_8. The three samples are P-19780, 19781 and 19782.

Visited: Property visited by MS & NSW ,DOGAMI, June 5 & 6, 1956.

Report by: Max Schafer

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State Department of Geology and Mineral Industries

1069 State Office Building
Portland 1, Oregon

PIKE CREEK CARNOTITE GROUP Harney County

Location: Pike creek, Harney County; Secs. 17-20, T. 34 S., R. 34 E.

Progress Report No. 1, supplementing the file report written under the above title by Corcoran and Wagner, September, 1955.

Forward: Whereas this report is designed to supplement the information presented in the above mentioned file report, a very brief summary of the pre-existing geologic setting is given here for the sake of providing the perspective needed to properly visualize the enlarged picture described below. This is simply that the original discovery consists of a radioactively mineralized zone located on the contact of a rhyolite breccia and rhyolite flow. Radioactivity is most intense on the contact wall proper but is also present to a lesser extent in the body of the breccia for a distance of some six or more feet from the contact. The rhyolite contains little, if any, of the radioactive mineralization.

While the possible presence of autunite is indicated by the green fluorescence of some minute crystals sparcely developed in the breccia, the greatest radioactivity always occurs at random places on the contact where the breccia is stained a deep brick red and is covered by a thin encrustation of a sooty, black mineral substance of obscure identity. The contact is sharp, conspicuous, steeply dipping to the east and essentially at right angles to Pike Creek in trend. It is exposed in the form of a natural outcrop situated on the near vertical south wall of the canyon and at the crest of a steep and locally well developed talus slope.

Ownership: This is the same as is shown in the original report, but the property is now held under lease by the United Uranium Corporation. Peter Relos, Postal Building, 518 S. W. Third Avenue, Portland 4, Oregon, is corporation president.

Development: The lessees have exposed the mineralized zone in shallow cuts dug through the talus and into bedrock at three points located directly below the discovery occurrence described in the original report. These cuts were examined on November 5, 1955, and the following is written for the purpose of describing the factors of geologic import that have been revealed by this work.

Geology: First and formost of the newly disclosed data is that the cuts have served to demonstrate the presence of a bedded tuffaceous clay horizon situated approximately 30 feet below the level of the original natural exposure. This tuff was previously obscured behind the talus.

Where exposed, the tuff dips moderately to the west, and the indications are that it continues to underlie the rhyolite flow rimrock of the canyon wall for an indefinite distance in that direction. The tuff is bounded on the east, however, by a wall of the same rhyolite breccia found in contact with the overlying rhyolite flows observed in the discovery pit.

Only short sections of the breccia were disclosed for study on the breccia side of the contact as the cuts were located for their most part in the tuff. Whereas this condition served to restrict examination of the breccia somewhat, various observations which can now be made nevertheless serve to suggest that the breccia may be an intrusive breccia rather than a fault breccia as originally postulated.

Radioactive mineralization is still represented in this breccia-tuff contact horizon by occurrences on the wall of the breccia of the same black, sooty looking radioactive material found on the original breccia-rhyolite contact surface. In addition crystals of autunite are also present in a state of abundance much greater than in the original exposure. These crystals occur in the tuff for a distance of 12 to 15 inches from the contact. They are best developed on bedding and fracture surfaces where interlocking clusters of crystals are sometimes quite prominent, but examination under a black light shows that autunite is also present in the body of the tuff in the form of tiny disseminated specks.

Field measurements of radioactivity indicate that the exposed contact zone as a whole emits about the same level of radiation as in the instance of the natural outcrop. Such measurements also indicate that the body of the breccia continues to be mineralized to about the same extent as previously manifest.

Conclusions: The indication that radioactive mineralization is consistently present to at least a limited extent in the body of the breccia permits the inference that at least part of the radioactive mineralization may have been introduced concurrently with the breccia at the time when a greater number of voids and minute fractures could conceivably have existed along the wall of the intrusion. The encrustation of greater enrichment found on the breccia surface proper shows, however, that the mineralization continued after this time, as does also the autunite development present in the more permeable portions of the tuff.

How significant this mineralization will prove to be at depth from the standpoint of mineable widths of mineable grade ore is a currently unpredictable factor, and much more data will be required in order to fully establish the geologic picture. The very fact that a tuff horizon has been demonstrated to exist in contact with the breccia is nevertheless encouraging. So also is the fact that autunite is found to be present in greater abundance in the permeable portions of the tuff thus far exposed. Since tuffs of this kind can, and frequently do, contain interbeds which show a wide range of lithologic and textural characteristics, there is therefore some justification for hoping that a more permeable horizon may exist at depth mineralized to an even greater extent than the horizon disclosed by the present development pits.

Proposed development: For the reason of further exploring the foregoing possibility, the lessees plan to drive a prospect tunnel along the contact at a point situated just above creek level and well below the lowest of the prospect pits just described. Such a tunnel at this location will certainly provide additional data which may help clarify some of the existing points which need to be clarified before any far reaching appraisal of the prospect can be made. It will also serve to prospect the tuff at a new horizon.

This work will be done on a contract basis, and is scheduled for immediate commencement.

Report by: N. S. Wagner

Date of Examination: November 5, 1955

Date of Report: November 25, 1955

1069 State Office Building
Portland 1, Oregon

Uranium Occurrences on Little Alvord Creek, Harney County, Oregon.

Location and Ownership: Two adjoining groups of claims have been located on the steep slopes of Little Alvord Creek canyon in secs. 8 and 9, T. 34S, R. 34E. The Timberbeast Mining Company holds 10 claims located in August 1956 on the south side of the creek and Lester Rhoads and associates hold 18 claims on the north. The principle owners of the Timberbeast Mining Company are George Slade, by whom most of the development work has been done, W. C. Teegarden, Glenn C. Young, and Charles Skeeters. The latter has acquired a ½ interest in both groups of claims.

Development: At the time of visit the Timberbeast property was developed by two crosscut adits 270 feet and 70 feet long and numerous small opencuts. No underground work had yet been done on the adjoining Rhoads property. Access roads have been built to most of the prospect workings. A DMEA loan has been applied for by the Timberbeast Mining Co. for continued development.

Geology: The rocks in the vicinity consist of the rhyolites, dacites and interbedded tuffs of the Pike Creek volcanic series and the underlying stratified tuffs, clays and interbedded lenses of chert and conglomerate of the Alvord Creek formation. These rocks were described in detail by Fuller (1) and later were mapped and described by Williams and Compton. (2) On the basis of fossil leaves, Axelrod (3) considered the Alvord Creek formation to be early Pliocene and suggested, due to its stratigraphic position, that the overlying Pike Creek series was also early Pliocene. Williams and Compton divide the Pike Creek series into several components but state that "both the lavas and tuffs in the area are so lenticular that the successions in adjacent canyons differ greatly. This lenticularity is due to the flows having been unusually viscous and to their having issued from a group of local vents-----." One such vent is well exposed near creek level immediately west of one of the more interesting uranium occurrences on the Rhoads property.

Members of the Pike Creek series which are most conspicuous in Little Alvord Creek canyon are massive flows of laminated rhyolite overlain by biotite dacite. Both of these units are hundreds of feet in aggregate thickness and stand in precipitous cliffs. The laminated rhyolite is separated from the overlying biotite dacite by a series of thin interbedded tuffs and flows.

These rocks are intruded by a dike of fine grained basalt or diabase approximately 8 feet wide. The dike strikes N 10°W and dips slightly westward intersecting Little Alvord canyon several hundred feet below its highest known exposure on the steep south wall of the canyon. Because of its relatively poor resistance to weathering, it can be traced by topographic expression for several hundred feet in horizontal distance on either slope of the canyon.

Uranium mineralization has been found in several places within the dike and along its contacts with the adjacent volcanics. High on the south wall of the canyon near the base of the massive biotite dacite flows, the Timberbeast Mining Company has driven two adits to crosscut the dike [redacted] These adits were driven in bedded tuffs and dacites containing small lenses of granular perlitic material. The upper adit which is 70 feet long and trends S 61°W crosscuts the dike at a depth of approximately 28 feet below the surface. On the west side of the dike was found a 6 to 8 inch seam of clays, "limonite" and manganese oxides. In this seam are small irregular zones of high radioactivity from which selected samples were estimated to contain up to 0.5% U_3O_8. Small quantities of autunite and torbernite are also present both in the dacite and in altered portions of dike adjacent to this seam. No radioactivity was found in the lower tunnel which trends S 45°W for 270 feet and crosscuts the dike about 120 feet south and 90 feet below the upper tunnel.

The portion of the dike exposed in the lower tunnel is considerably less altered than that in the upper tunnel. Though substantiating evidence is incomplete by virtue of the dike being exposed in only two places beneath the surface, it may be that both the alteration of the dike and the deposition of the uranium are phenomena of weathering rather than of hydrothermal action. If this is true the intensity of alteration and the quantity of associated uranium will undoubtedly decrease with depth.

On the surface, particularly south of the underground workings, occasional zones of high radioactivity have been found along fractures of little or no displacement cutting the volcanics adjacent to the dike. The walls of these fractures are weakly silicified and, because in many of the associated radioactive occurrences no uranium minerals are visible, it seems likely that the uranium is intimately mixed with the silica contained in the fracture walls. In such occurrences the radioactivity rarely penetrates the rock more than one inch and little visible evidence of mineralization other than minor silicification is present. Other surface occurrences do contain visible uranium minerals. One of these occurs in spherulitic tuff near the intersection of a fracture trending N 70°W with one trending N 10°E. Its exposed dimensions are very limited.

Most of the known radioactive occurrences are within a few tens of feet of the dike but on the Rhoads property north of the creek small deposits have been found in fractures several hundred feet from its projected course.

The discovery now being developed by Rhoads occurs near the canyon floor on the north side of the creek. Here the dike intersects what may be the upper part of Alvord Creek formation. However the deposit appears to be confined to rocks derived from the vent immediately to the west. Due probably to the close proximity of the vent, the flows of rhyolite breccia and glass dip steeply south in contrast to the normal gently westward dip of the surrounding rocks. The deposit occurs along the walls of an open fracture cutting an exposed layer of rhyolite breccia in contact with underlying layered tuffs. The breccia strikes N 50°W and dips 45°SW. The open fracture which trends N 40°E is about 3 feet wide and is filled with soil and loose rock. An open cut about 20 feet long has been driven between the walls of the fault and into the underlying tuff. Evidence of the fault ends abruptly at the contact between the tuffs and the overlying rhyolite indicating possibly that the slab of rhyolite breccia is either in fault contact with the tuff or is merely a slump block.

That the walls of the fault were spread apart subsequent to the deposition of the uranium is indicated by matching distribution of radioactivity on the two walls of the fault. The wall rocks have been partially altered to clay and small quantities of "limonite" manganese oxides and silica have been introduced. Several spots along the adjacent walls of the fault contain the radioactive equivalent of in excess of 0.5% U_3O_8 and occasional secondary uranium minerals have been found. The main concentration occurs in small knots, up to 2 inches in diameter, of soft dark grey to black material of indefinite composition. The radioactivity decreases sharply and rarely penetrates the wallrocks more than an inch or two.

A dike believed to be that with which the uranium mineralization is associated south of the creek is exposed in an open cut less than 15 feet west of the mineralized fault. Weak radioactive anomalies are said to occur at various points along the topographically indicated course of the dike north of the creek but where exposed in the open cut no radioactivity was found.

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(1) Axelrod, D. I., 1944, The Alvord Creek Flora, in Chaney, R. W. (editor), Pliocene floras of California and Oregon: Carnegie Inst. Washington Pub 553.
(2) Fuller, R. E., 1931, The geomorphology and volcanic sequence of Steens Mountain in southeastern Oregon: Washington Univ. (Seattle) Pub. in Geology, vol. 3, no. 1, pp. 43-121.
(3) Williams, Howell and Compton, Robert R., 1953, Quicksilver Deposits of Steens Mountin and Pueblo Mountains, Southeast Oregon, U. S. Geol. Surv. Bull. 995-B.

Reported by: H. C. Brooks -- February 6, 1958

Date of Exam; October 2, 1957.

State Department of Geology and Mineral Industries

1069 State Office Building
Portland 1, Oregon

Progress report on the exploratory development of the Timberbeast Mining Company uranium prospect, on Little Alvord Creek, Harney County, Oregon.

Addendum to report by H. C. Brooks, February 6, 1958.
Date of previous exam - October 2, 1957.

During the winter of 1957-1958 about 270 linear feet of drifting was done from the lower adit under contract with the D.M.E.A. A drift was driven along the west side of the dike for 180 feet to intersect a fault trending S 85° E along which minor uranium mineralization had been found on the surface. A drift was then driven eastward along the fault for about 90 feet. The south extension of the dike is offset to the east along the fault about 9 feet on the surface and 15 feet at the adit level, which according to Slade is roughly 260 feet vertically below the surface exposure. Underground west of the dike the fault is narrow and exhibits little evidence of strong movement. East of the dike, lenses of wet clayey gouge (some several feet in width) have been exposed and the walls of the drift are wet and highly altered. The fracture dips roughly 65° south.

No ore grade material has been developed and uranium minerals are rarely distinguishable. Small discontinuous zones of weakly radioactive material occur along fractures in the volcanics adjacent to the dike and in the gouge zones along the intersecting fracture. The radioactivity is generally associated with thin, but in places numerous and closely spaced seams of ilsemenite. However, much of the ilsemanite bearing material is not radioactive.

Work was terminated about June 1, 1958 pending the decision of the D.M.E.A. as to whether further exploratory work would be allowed under the D.M.E.A. contract. About 350 feet of development work remains to be done in the second stage of the contract in the event the work is justifiable.

Little additional work has been done on the Rhoades property.

Report by: Howard C. Brooks, July 8, 1958.

Date of exam: June 15, 1958.

1069 State Office Building
Portland 1, Oregon

PIKE CREEK CARNOTITE GROUP — Harney County

Owners: Dewey M. and Alma M. Quier, Burns, Oregon: C. P. and Gladys M. Woodle, Corbett, Oregon; Beulah Rhoads, Burns, Oregon.

Location: Secs. 17 and 20, T. 34 S., R. 34 E., Harney County. The claims are confined mostly to a narrow zone along Pike Creek approximately 3 miles south of Alvord Ranch.

General geology: The general stratigraphic sequence in this area of Steens Mountain consists of a series of northwesterly dipping Tertiary volcanics. These are best exposed on the east face of the range and were first named and described by Fuller (1931) and later by Williams (1953). On the basis of their investigations this series has been divided into four major formations as follows (oldest to youngest): (1) Alvord Creek formation, acidic tuffs and tuffaceous sediments with some leaves; (2) Pike Creek volcanic series, rhyolitic and dacitic flows and tuffs; (3) Steens Mountain volcanic series, basalts and andesites with subordinate dacites and rhyolites; and (4) Steens basalt, cliff-forming flows of olivine basalt.

The age of the volcanics is based largely on the fossil floras found within the Alvord Creek beds near the base of the exposed section and these have been variously dated from upper Miocene to lower Pliocene (Fuller, 1931 and Axelrod, 1944). Unfortunately fossil leaf dating has not reached the accuracy or dependability of vertebrate dating, but the apparent stratigraphic similarity of the Steens Mountain section to the Owyhee section to the northeast (Porter, 1953) would tend to show the age of the Alvord Creek beds to be Mascall-Payette equivalent (upper Miocene). Farther to the south in the Pueblo Mountains area Fuller shows that the Steens basalts dip conformably beneath the Thousand Creek beds which contain a large mammalian fauna of middle Pliocene age (Wood, et al, 1941). This places the age of the Steens Mountain volcanics, therefore, between upper Miocene and middle Pliocene.

The elevation of the range began after the eruption of the Steens basalts and probably even after the Thousand Creek beds were laid down. This would place the time of uplift in the middle or late Pliocene or earliest Pleistocene. The east face of Steens Mountain is much steeper than the west side and shows the typical geomorphic features identified with basin and range fault-block mountains (faceted spurs and hot springs, etc.). Smith (1927) considered the major uplift along the east side of the range to be due to large-scale thrust faulting by compressional forces, but a rebuttal by Fuller and Waters (1929) clearly showed that these are normal faults produced by tensional stresses.

Geology and mineralogy of the deposit: The area showing the greatest radioactive anomaly is confined to a fairly narrow shear zone in acid lavas of the Pike Creek volcanic series and is exposed in a narrow canyon approximately one-half mile upstream from where Pike Creek debouches onto its alluvial fan on the west side of Alvord basin. Williams divides the Pike Creek series into five members based on the dominant lithology of each, and the mineralized fault zone appears to be within his "lower laminated rhyolite" where it is exposed in the creek bed. The fracture zone is approximately 6-10 feet wide, strikes N. 30° E. and dips about 60° E. The country rock is a hydrothermally(?) altered pinkish-gray brecciated and silicified rhyolite made up predominantly of a "mat" of very poorly sorted angular fragments of felsitic rhyolite up to 1 inch (most of which show well-developed flow banding) in a dense siliceous aphanitic groundmass. The radioactive mineralization is confined almost entirely to a fairly narrow "selvage" bordering the fracture surfaces of the rock within the fault zone and is especially concentrated along the footwall side. These surfaces have been stained a deep dull red color which grades imperceptibly downward into the unaltered rock within a distance of one-half to three-quarters of an inch. A slab of the rhyolite approximately three inches wide and one-half inch thick was cut from the rock normal to the plane of the mineralized fracture surface. This in turn was split into equal portions; each approximately 1½ inches wide; one from the upper half of the slab which included the "high count" mineralized zone and one from the lower half which showed a much lower count. Chemical analyses from these two portions showed 0.36 percent U_3O_8 from the upper half and 0.04 percent U_3O_8 from the lower half.

An attempt was made to concentrate the radioactive material along the fracture zones by crushing and panning but with little success, since all of the material seemed to have almost the same specific gravity. A check on the Geiger counter showed that, if anything, the "lights," after panning, were slightly more radioactive than the "heavies." It is interesting to note that the water in which the material was panned also showed a trace of radioactivity (approximately 0.015 percent U_3O_8 on the radioassayer) even after standing overnight. Under the microscope both the "lights" and the "heavies" were found to be composed almost entirely of chalcedony with a minor amount of very finely disseminated magnetite. No minerals of high relief could be discerned and no radioactive opaques could be identified with certainty.

Conclusions: The last visit by anyone from the Department (Dole and Wagner, 8/12/55) showed that no pitting or development work of any kind has been done on the shear zone. A trail, however, was bulldozed up one of the spurs on the north side of Pike Creek to an elevation approximately 300 feet above the stream bed. None of the rhyolitic material examined along this trail showed any abnormal count and no development work was in evidence at the top where the trail ended. In the shear zone itself no more than 50-60 feet of mineralized rock is visible and even this is exposed only on the south side of the creek.

The very dense nature of the rhyolite would seem to preclude the possibility of the mineralizing fluids being able to impregnate the country rock for any appreciable distance. This is strikingly shown in the rapid drop in U_3O_8 content with distance from the mineralized fracture surface. It is very likely that the U_3O_8 content of the outermost one-fourth inch of rock nearest the mineralized surface may in some cases be as high as .5 to 1.0 percent U_3O_8 (or perhaps even higher on the basis of some scintillator readings taken on the best looking material!), but the far greater volume of very low-grade material with which the "high grade" is intimately associated and which must be mined along with it would almost certainly result in an overall average U_3O_8 content considerably less than the minimum acceptable.

If, however, the fracture system became more closely spaced with depth (although there does not appear to be any surface indication to this effect) it is possible that a larger volume of rock might become sufficiently mineralized to be accepted as commercial grade ore. Another avenue that may be worth investigating is the possible presence of mineralized tuffaceous interbeds which are known to exist both above and below the rhyolite member. Because of their greater relative porosity and permeability, the chances of their being more completely impregnated by the ore solutions are much greater than with the much denser rhyolites except in those areas where the latter have become brecciated due to movement along a fault zone.

The extent to which the tuffs could be impregnated by the ore solutions would depend largely on whether the silicification of the country rock occurred before, during, or after deposition of the radioactive material. Since the radioactive minerals in the brecciated rhyolite cannot be discerned it is impossible to determine the relationships in this rock between the time of silicification and uranitization. If the silicification of the country rock was prior to the precipitation of the radioactive material, then the type of host rock would have little, if any, bearing on the mode of deposition of the uranium. On the other hand, if silicification of the host rock was contemporaneous with or after uranitization then the porosity and permeability of the host rock might become a critical factor in determining the possible volume of ore deposition. The evidence at the Pike Creek locality would indicate that silicification of the breccia occurred before very much uranium had a chance to be deposited. This is based on the observation that the zone of uranitization is very narrow compared to the zone of silicification. If introduced silica had not rendered the breccia relatively impermeable to later solutions working up along the fault fractures, then the uranium-bearing material would have had a chance to become more widely disseminated throughout the entire shear zone. If this reasoning with respect to the origin of the uranium in the rhyolite breccia is valid, then it is reasonable to assume that the tuffs in this vicinity would, where intersected by the mineralized fault zone, also be highly silicified and therefore relatively impervious.

Report by: R. E. Corcoran and N. S. Wagner

Visited: July 15, 1955 by N. S. Wagner; July 27, 1955 by R. E. Corcoran; August 12, 1955 by N. S. Wagner and H. M. Dole.

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