CORRESPONDENCE OF RAFINESQUE AND CUTLER.

TO THE EDITOR OF SCIENCE: Apropos of the letter from Rafinesque to the Rev. M. Cutler, printed in SCIENCE of May 2 (pp. 713, 714), allow me to point out that another letter from Rafinesque to Cutler will be found in Cutler's 'Life, Journals and Correspondence,' 1888, II. 311–314. This letter is dated Palermo, January 28, 1807, and is signed 'C. S. Rafinesque-Schmaltz, Chancellor of the American Consulate, Palermo.' ALBERT MATTHEWS.

BOSTON, May 3, 1902.

MASS AND WEIGHT.

TO THE EDITOR OF SCIENCE: In view of the wide interest at the present time in the subject of measurement and in view of the probable change soon to be made in the national system, I beg to call attention to the great need for a radical change in the title used.

It has long been denoted a system of 'Weights and Measures.' This title, it seems to me, gives much undue importance to the idea of weight which is only a particular kind of a force. The weight idea is of little use except as a convenience in comparing masses at a single location. A standard of weight is of no real value, since weight is only the earth's attraction of a body, and depends upon the latitude, altitude, etc., of the body. Furthermore, since weight is only one of the many measurable quantities, what more is implied in the title 'Weights and Measures' than in the simple term *measurement*?

Commercially, the quantity of matter concerned, *i. e.*, the mass, is the real thing of importance; the balance being merely a convenient apparatus for comparing and so determining the relative values of masses.

I urge due consideration of this topic by all interested, feeling that a change in the wording of an old title is very desirable, and that the proper time to bring this about is the present. I suggest that the title 'Measurement' be employed in place of what seems to me the inappropriate term 'Weights and Measures.'

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SHORTER ARTICLES.

A SUPPOSED EARLY TERTIARY PENEPLAIN IN THE KLAMATH REGION, CALIFORNIA.

IN another paper, now in preparation, the writer will endeavor to show that remnants of an erosion base level equivalent to the late Tertiary peneplain of the Sierra Nevada region may be identified in the Trinity basin, between Trinity Center and Weaverville, in Trinity county, California, at an altitude of about 3,800 feet. While it yet remained a lowland plain, there rose abruptly above it on the west of the Trinity River the serpentine, granodiorite, gabbro and schist peaks of the Sierra Costa Mountains. Climbing to the summit of one of these peaks, we see what appear to be evidences of an older base level, a dissected peneplain.

With all its ruggedness and deep erosion, the Sierra Costa range is virtually a dissected plateau, about fifty miles in length in a direction north of east and twenty miles in average width. The principal peaks attain about the same altitude and none rise prominently above a general level. There is among them the regularity which we should expect from a very old peneplain which has been almost destroyed by erosion. There is nothing in the structure to explain this regularity, as the region is one mainly of huge *massifs* of serpentine, gabbro and granodiorite intruded into each other, with a belt of highly tilted schists on the southwest and limited areas of slate and greenstone toward the northeast.

From a position on the divide between Coffee Creek and its north fork, one of the high mountains between Trinity River and its east fork presents the appearance of an elevated plateau which one imagines to be about one square mile in area. From Grizzly Peak, a prominent mountain standing at the northeastern corner of the McCloud-Pitt projection of the Klamath region, one can look over all the mountains as far west as the Sierra Costa range, and this latter being so far distant, the valleys are not seen, but the peaks coalesce to form a crest-line whose evenness is startling to one used to the irregularity of Klamath topography.

These are the only evidences yielded by the Sierra Costa range similar to those usually depended on in the Mississippi basin to establish a dissected peneplain, and they may be deceptive, for it is not certain that the comparative uniformity in the height of the peaks may not be due to the intersection of slopes in accordance with the theory advanced by Penck. A symmetrical drainage system nearly everywhere trenched down to the late Neocene base level might be expected to reduce all the principal divides to about the same level.

But there is another and stronger evidence of peneplanation at the level of the high peaks. It is to be found in the behavior of the streams. In a general way the rivers and creeks of the Sierra Costa region ignore the structure. For instance, the old Coffee Creek rose in the Abrams mica schist (not very resistant relatively to other formations) flowed obliquely across on to the Salmon hornblende schist (quite resistant), made a sharp turn and then crossed at nearly a right angle belts of mica schist (not resistant), serpentine (moderately resistant), mica schist (not resistant), serpentine (moderately resistant), gabbro (very resistant), serpentine (less resistant), granodiorite (moderately resistant) and serpentine (less resistant). Why was not the stream deflected along the softer belts and around the *massifs* of gabbro and granodiorite if the structure in any way controlled the course?

All the higher peaks in this region are composed of granitic rocks, gabbro or hornblende schist, showing that these three are the most resistant to weathering. All the valleys narrow decidedly upon entering on the area of the gabbro and the hornblende schist showing that these formations are the most resistant to stream erosion. Yet the streams will cross these formations when they might take an easier course around them.

There is another way of looking at it: The granodiorite batholiths were the last to be intruded. They have the form of gigantic volcanic necks, being in most cases vertical columns of granitic rock rising up through the other formations. Whether or not any of the material ever reached the surface and formed rhyolite volcanoes, it is likely that the strata were more or less arched over these *massifs*. The bulging must have been effected so rapidly that any important streams flowing over their sites would be deflected. Without a subsequent rearrangement of the drainage system, the trunk streams should avoid these granite *massifs*, which in some important cases they do not. There can be little doubt that the drainage system of the Sierra Costa area is superimposed on the structure.

The independence of the Sierra Costa streams from the structure was already developed when the drainage was no lower relative to the rocks than the tops of the present peaks. It implies that a rearrangement had occurred previous to the beginning of trenching of the present valleys. Such a rearrangement must have been effected on a plain. When migration of streams is brought about during simple down-cutting or deepening of valleys it is controlled by the structure. A radical rearrangement independent of structure necessitates a plain, either of aggradation or of denudation.

This argument does not establish the connection between such a plain and the uniformity in height of the present peaks. We do not know whether the rearrangement occurred on an uplifted sea bottom (a plain of aggradation) or on a true baselevel of erosion. And if the latter, we do not know whether this baselevel was developed in the plane of the summits of the present peaks or higher in the strata. These are problems to be solved in the future. At present we can only say that the examination of the stream courses indicates that such a peneplain was developed, increasing the probability that the present summits of the Sierra Costa peaks do represent a dissected peneplain.

Very few geologists have climbed to the summit of the Sierra Costa Mountains. Dr. A. C. Lawson had a partial view of the supposed peneplain level from Battle Mountain, altitude about 7,675 feet above the sea. He recognized the pertinence of the evidence and was willing to accept the idea of the dissected

peneplain with a very strong element of doubt. Mr. J. S. Diller saw the summit level of the peaks from the top of Mt. Courtney, altitude about 8,800 feet, and he felt very strongly inclined to recognize the supposed eroded base level. As for myself, I have never before ventured to recognize a dissected peneplain on such slender evidence, but I think that in time it will come to be an established fact, although at present I shall refer to it with a question mark.

In the early stages of this investigation I entertained the idea that the dissected peneplain (?) of the Sierra Costa summits was of Cretaceous age, a portion of the same base leveled land surface on the borders of which after submergence the Horsetown and Chico sediments were deposited, but reflection has shown this to be improbable. The peneplain (?) has suffered little deformation over an area fifty miles long and twenty miles wide. It is not likely that such an extensive tract would remain intact while orographic disturbances of the greatest magnitude were occurring in its neighborhood. The inference is that it has been developed at a later date if it is really a feature of Klamath physiography, and must be credited to the early Tertiary times.

That such a peneplain was developed outside of the Sierra Costa area subsequent to the first post-Chico disturbance, over at least that portion of the Klamath region which had been covered by the Horsetown sediments, is evidenced by the behavior of the drainage system of that region. The northward drainage of the district between the Bully Choop range and the Trinity River was apparently inaugurated by the post-Chico disturbance, but since then there has been somewhat of a rearrangement of the system. A trunk stream ought to follow the line of basins marked by the four Cretaceous remnants south of the Trinity River, but, instead, all the main creeks cross this line and traverse the structurally higher ground on the north. Moreover, several of the most prominent streams as the Hay Fork, Salt Creek and the South Fork of Trinity River cross the line along the structural ridges which separate the basins, while one of the largest Cretaceous remnants constitutes the divide between two important creeks, Hay Fork and Salt Creek. The Indian Creek Cretaceous area is crossed by three parallel creeks, Indian, Reading and Brown's, separated by low divides where they are composed of the soft Cretaceous strata, yet these creeks traverse a high broad mica schist ridge in deep narrow gorges on their way to Trinity River. The drainage could not very well be more independent of the structure either of the metamorphic rocks or of the post-Chico deformation. It seems that the surface of this region was planed down and the streams then migrated and adopted the shortest course to the great trunk stream flowing west (or east) midway between the present Bully Choop range and the Sierra Costa range.

This rearrangement was not effected on the late Neocene surface (correlated with the Sierra Nevada peneplain), as the country of that time at some distance away from the main streams was too hilly. It seems rather to have been the result of the disturbance of an earlier peneplain—what more natural than to correlate it with the supposed dissected peneplain of the Sierra Costa summits!

In the extreme southwestern part of Oregon and in the adjoining section of California, Diller* has discriminated a dissected peneplain surface which truncates the tilted Miocene strata and hence is of late Tertiary age. It is best developed on the rocks of the Coast Range region, but also penetrates the Klamath region. Standing on one of the higher summits of the Sierra Costa range, as Mt. Thompson, altitude 9,345 feet, or Mt. Courtney, altitude about 8,800 feet, this peneplain is well displayed. It is marked by a general evenness of the surface of the mountain ridges which in the far distance merge into an apparent plain. It is as well preserved as one of the dissected peneplains of the Eastern States. The whole country to the westward of our position seems to have a general and even slope toward the west-southwest. There are a few monadnocks in sight, notably Preston Peak near the Oregon line.

* Coos Bay Folio of the Geologic Atlas of the United States.

Now the curious feature about this view is that the supposed dissected peneplain of the Sierra Costa mountains seems continuous with the more western peneplain, *which must be deceptive.* Taking into consideration a great arching of late Pliocene or early Pleistocene age which the uplifting of the Neocene channels in western Trinity and Siskiyou counties makes practically a certainty, we shall see that there cannot be a gradual and even slope in an older peneplain from the Sierra Costa Mountains to the sea. The peneplain (?) of the Sierra Costa summits should rise up several thousands of feet west of Mt. Thompson before beginning its slope toward the ocean. Instead, the general surface drops away rapidly at the western edge of the Sierra Costa Mountains and no peneplain is represented for some miles westward. This fact is not at first appreciated, and hence the impression that the peneplain west of this eroded area is the same as that supposed to pass through the Sierra Costa summits.

My explanation is that the Sierra Costa peneplain (?) has been destroyed throughout the country west of Mt. Thompson, but that a later and lower peneplain was developed in that direction. This will be tentatively correlated with the late Pliocene base level of the old Trinity valley, because it is below this western peneplain that the deep Sierran valleys are trenched. The arching of the surface, to which is apparently due the deep gorges of the lower Trinity and Klamath rivers brought up this later peneplain to such a level as to make it appear a projection of the Sierra Costa peneplain (?).

The latter, if it ever existed, is regarded as virtually destroyed throughout the Klamath region except over the Sierra Costa Mountains and a few outlying ridges and peaks. In a general way, the Marble Mountain range and a part of the Siskiyou range seem to answer the requirements of such remnants. It is possible also that the Yallo Ballo Mountains, Bully Choop Peak, the Towerhouse Bally and some of the higher points of the Rogue River range may reach nearly to the old peneplain (?) level; but all the remainder of the Klamath area was reduced much below that level by the close of the Tertiary era.

There has been too much generalizing in the past on the subject of Klamath physiography, and this paper, by intimating some of the complexities of the problem, may be considered a protest against it.

Oscar H. Hershey.

Berkeley, Cal.,
Nov. 14, 1901.

THE RATE OF INTEREST ON GOVERNMENT SECURITIES.

McCoy's Tables, issued by the Treasury Department at the commencement of each month, exhibiting the market prices and investment values of the securities of the United States, attract little attention from the public or the press and yet they contain the most perfect measure of the business conditions, the healthfulness of the industries and the public credit that can be found. The issue of June 2, giving the figures for the month of May, has just come to hand. There are five issues of securities, the 'consols' of 1930, the Loan of 1908–18, the Funded Loan of 1925 and the Loan of 1904. These bear, respectively, 2, 3, 4, 4 and 5 per cent. interest and mature at the latest of the dates given above for each. Interest is payable quarterly.

The Two-per-cents of 1930 sold at an average of 109.5375, netting to the purchaser an average of 1.587 per cent. The Threes of 1908–18 sold at 108.4775, bringing in 1.584 per cent. The Fours of 1907 brought 110.3225 earned, net, 1.784. The Fours of 1925 give the figures 137.3920 and 1.957. The Fives of 1904 similarly give 105.8237 and 1.547.

The Fives of 1904 have the highest price of any securities, governmental or private, now in existence or which ever were known in history. The credit of the United States, at this moment, stands higher than that of any other nation, contemporary or of earlier times. The Two-per-cent Consols measure that credit perhaps more accurately than any other of these securities and are sold at a higher figure than ever were any such securities in the history of finance. During this