stead of $n = 5$ in the case of Rb will lead to a value of $n^* = 2.80$, approximately, while the choice of $n = 8$ for Cs will yield $n^* = 3.80$, approximately.

It thus appears that Turner's assignment, if true, will necessitate a complete rearrangement of the inner quantum groups—a very serious step and one open to much criticism in the opinion of the present writer. One significant point may be mentioned here. The writer found in the calculations above mentioned that the computed values of the dimensions of the outermost orbits in the ionized alkali atoms (a measure of the ionic radii) obey the Grimm inequality law,[4] *viz.*,

$$R_K - R_{NS} > R_{Cs} - R_{Rb} > R_{Rb} - R_K$$

where R_{Na}, R_K, etc., refer to the radii of the ions of sodium, potassium, etc. This law appears to be an extremely fundamental one in connection with atomic characteristics in general. (It is interesting to note that it is followed, as might be expected, by the effective quantum numbers themselves). A rearrangement of the inner groups of orbits in Rb and Cs would vitiate this result, and lead to values for the dimensions of these ions which are much too large in comparison with the dimensions of the lighter alkalies.

In the opinion of the writer it is therefore apparent that Turner's assumption, while leading to an interesting result, can hardly be maintained.

A thorough study of the quantum defect may be expected to be of great value in the development of the Bohr theory, particularly in connection with the analysis of the spectral terms of multiply-ionized atoms. Certain simple relations relevant hereto and admitting of simple interpretation on the Bohr theory are in process of derivation and arrangement by the writer and will be published shortly.

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WHITE INDIANS OF DARIEN

LIONEL WAFER, a ship's doctor and an associate of Dampier's, has left us an interesting account of the White Indians of the Isthmus of Darien. Wafer fell into the hands of the Darien Indians on the 5th of May, 1681. These were copper-colored natives of the coast, but while a captive among them he had frequent opportunities to observe other Indians of a different complexion. He has this to say about the White Indians:[1]

[4] H. Grimm, *Zs. f. Phys. Chem.*, 5, 353, 1921.

[1] "A New Voyage and Description of the Isthmus of America," by Lionel Wafer (Reprinted from the original edition of 1699) Cleveland, The Burrows Brothers Company, 1903.

There is one Complexion so singular, among a sort of People of this Country, that I never saw nor heard of any like them in any part of the World. The Account will seem strange, but any Privateers who have gone over the Isthmus must have seen them, and can attest the main of what I am going to relate; tho' few have had the opportunity of so particular an Information about these People as I have had.

They are White, and there are of them of both Sexes; yet there are but few of them in comparison of the Copper-colour'd, possibly but one to two or three hundred. They differ from the other Indians chiefly in respect of Colour, tho' not in that only. Their Skins are not of such a White as those of fair People among Europeans, with some tincture of a Blush or Sanguine Complexion; neither yet is their Complexion like that of our paler People, but 'tis rather a Milk-white, lighter than the Colour of any Europeans, and much like that of a White Horse.

For there is this further remarkable in them, that their Bodies are beset all over, more or less, with a fine short Milk-white Down, which adds to the whiteness of their Skins: For they are not so thick set with this Down, especially on the Cheeks and Forehead, but that the Skin appears distinct from it. The Men would Probably have white Bristles for Beards, did they not prevent them by their Custom of plucking the young Beard up by the Roots continually: But for the Down all over their Bodies, they never try to get rid of it. Their Eye-brows are Milk-white also, and so is the Hair of their Heads, and very fine withal, about the length of six or eight Inches, and inclining to a Curl.

They are not so big as the other Indians; and what is yet more strange, their Eye-lids bend and open in an oblong Figure, pointing downward at the Corners, and forming an Arch or Figure of a Crescent with the Points downwards. From hence, and from their seeing so clear as they do in a Moon-shiny night, we us'd to call them Moon-ey'd. For they see not very well in the Sun, poring in the clearest Day; their Eyes being but weak, and running with Water if the Sun shine towards them; so that in the Day-time they care not to go abroad, unless it be a cloudy dark Day. Besides they are but a weak People in comparison of the other, and not very fit for Hunting or other laborious Exercise, nor do they delight in any such. But notwithstanding their being thus sluggish and dull and restive in the Day-time, yet when Moon-shiny nights come, they are all Life and Activity, running abroad, and into the Woods, skipping about like Wild-Bucks; and running as fast by Moon-light, even in the Gloom and Shade of the Woods, as the other Indians by Day, being as nimble as they, tho' not so strong and lusty.

The Copper-colour'd Indians seem not to respect these so much as those of their own Complexion, looking on them as somewhat monstrous. They are not a distinct Race by themselves, but now and then one is bred of a Copper-coloured Father and Mother; and I have seen a Child of less than a Year old of this sort. Some would

be apt to suspect they might be the Off-spring of some European Father: But besides that the Europeans come little here, and have little Commerce with the Indian-women when they do come, these white People are as different from the Europeans in some respects, as from the Copper-colour'd Indians in others. And besides, where an European lies with an Indian-woman, the Child is always a Mostesa, or Tawney, as is well known to all who have been in the West-Indies; where there are Mostesa's, Mulatto's Etc. of several Gradations between the White, and the Black or Copper-colour'd, according as the Parents are; even to Decompounds, as a Mulatto-Fina, the Child of a Mulatto-man, and Mostesa-woman, Etc.

But neither is the Child of a Man and Woman of these white Indians, white like the Parents, but Copper-colour'd as their Parents were. For so Lacenta (an Indian chief) told me, and gave me this as his Conjecture how these came to be White, That 'twas through the force of the Mother's Imagination, looking on the Moon at the time of Conception; but this I leave others to judge of. He told me withal, that they were but short-liv'd.

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AGE OF SHAD ESTIMATED FROM EXAMINATION OF SCALES

AN estimation of the age of fish by counting the number of annular rings on the scales has been possible in the case of numerous species. For the shad (*Alosa sapidissima,* Wilson), however, this appears not to have been done up to the present time; although considerable success has been attained in age estimation of certain *Clupeidae* other than shad, for example, the herring.

The investigation, authorized by the Connecticut State Legislature and undertaken by the Board of Fisheries and Game for the purpose of discovering the cause and cure of the decline of Connecticut River shad, necessitated an extension of the meager existing knowledge of shad migrations. Age determinations were required for this phase of the work.

The annular rings (annuli) of the shad scale are rather difficult to see and to differentiate from other circular markings on the scale. I have therefore undertaken a systematic study of the scales from shad of various sizes, studying all the scale markings. Preliminary experience with staining and other methods of preparation to bring out the annular markings gave unsatisfactory results. It therefore appeared necessary to make use of other markings. Of these, the transverse grooves running completely across the scale were found to have a constant relation to the annuli in those scales in which the latter were sufficiently distinct to be counted. The relation is: two *complete* grooves (omitting incomplete ones) to one annulus. In young shad of known age, less than one year, there are one or two complete transverse grooves on the scale. Although annuli should be counted when possible, the counting of the grooves gives supplementary information and may even be relied upon when the annuli are not distinguishable. The number of the complete grooves divided by two gives the age of the shad in years.

Age determinations by this method have been confirmed by examination of the otoliths of shad. Mr. R. L. Barney, who has made these examinations, finds that the size and markings of the otoliths give age estimations which agree with the scale readings.

The scales selected for observation should be of regular shape and should show no distortion of scale markings such as apparently result from the effects of external injuries. I have used scales from the anterior part of the body at a point about half way between lateral line and pectoral fin.

Examination of shad ascending the Connecticut River during the present season shows that males are of ages four, five, six, seven and eight years, females, seven, eight, nine and ten years. Adult shad of both sexes of sizes less than 32 cm in length occur, as a rule, only in the sea.

This report is preliminary. A more extended account with drawings and microphotographs of the scales and with tabulated data will be published later.

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THE FRESH-WATER JELLYFISH (CRASPEDACUSTA SOWERBYI) IN KENTUCKY AGAIN

THIS fresh-water medusa, for many years regarded as a rarity by zoologists, appears to have become permanently established in Kentucky. In 1916 and 1917[1] it was found by the writer in great numbers in Benson Creek, but in subsequent seasons (of 1918 to 1923, inclusive) it was not found and thus seemed to have remained true to its history of infrequent appearances at widely separated points on the globe. But a visit made September 5, 1924, to the spot where it was discovered in 1916 showed it to be still there. Many were collected; hundreds could have been obtained. On the twelfth of this month a second visit to the locality showed it less common at the surface of the water, but in several hours spent in the search it was learned that it had retreated to a depth of several feet and could be brought up in some numbers by stirring the water with the oars of a rowboat. Its movements are stimulated by sunlight, and as the day was cloudy but few were attracted toward the

[1] SCIENCE, Vol. XLIV, 1916, p. 858; Vol. LVI, n. s., 1922, p. 664.