Leser zu der Auffassung gelangen, daß mir, bei dem angeblichen Zeitunterschied im Erscheinen der betreffenden Abhandlungen, die Untersuchung der belgischen Forscher bekannt war oder doch wenigstens hätte bekannt sein sollen, daß ich aber außer Stande gewesen sei, meine Untersuchungen so weit wie meine Vorgänger zu führen.

Dem gegenüber stelle ich fest, daß meine diesbezüglichen Beobachtungen im Winter 1883 in Leipzig zum Abschlusse kamen und daß das Manuscript Anfang des Jahres 1884 der Redaction der Jenaischen Zeitschrift übermittelt wurde. Meine Abhandlung erschien im ersten Hefte des 18. Bandes, welches, wie der Titel beweist, am 15. August 1884 ausgegeben wurde. Die Arbeit Van Beneden's und Julin's ist im Juli-Hefte der Bulletins für 1884 abgedruckt. Den Tag der Ausgabe dieses Heftes habe ich nicht feststellen können. In Rücksicht darauf, daß der Abhandlung Van Beneden's ein längerer Bericht über die Academiesitzung vom 5. Juli 1884 vorhergeht, dürfte er aber, selbst bei der Annahme einer sehr beschleunigten Drucklegung, kaum vor den 15. August gefallen sein.

Demnach ist meine Untersuchung nicht, wie Salensky behauptet, ein Jahr nach der Abhandlung von Van Beneden, sondern fast gleichzeitig mit dieser erschienen.

Berlin, 1. November 1893.

3. Note on the spawning conditions of the sturgeon.

By Bashford Dean, Columbia College, New York.

eingeg. 3. November 1893.

Of the breeding habits of the Sturgeon (*Acipenser sturio*) little has been recorded either by practical fish-culturists or by students of embryology. In the following preliminary paper a few notes are given as to the movements of the fish during spawning and as to the natural conditions under which the eggs are deposited and hatched.

Along the eastern coast of the United States a rich Sturgeon fishery has been becoming very generally depleted. And in view mainly of cultural needs an experimental study — during the spring of 1893 — was carried on by the writer in behalf of the governmental Commission of Fisheries. The station chosen for the experiments was in the region of the mouth of the Delaware at Delaware City, a point especially favorable as the work of Prof. Ryder[1] in 1888 had demonstrated. During the writer's visit about fifty fish were brought in daily to the wharfs of the fisherman and during the spawning time there was abundant material for cultural studies.

[1] Prof. John A. Ryder, U. S. F. C. Bulletin, 1888.

As to the mode of occurrence in this locality of the adult fish a few notes might be given. They are usually taken as they pass up the river in »schools«. These »schools«, or »runs«, as the gill-netters state, comprise as many as thirty or forty individuals; they occur at brief intervals, are usually at the beginning of the tides and as frequent by day as by night. During the season of well marked »runs« the earlier fish are of unripe ovaries (»cow fish«), valuable, therefore, in the making of caviare: these, accordingly might well be expected to pass furthest up the river to spawn. From a few days to a fortnight later occur spawning fishes (»runners«), a »run« that is surprisingly brief, often at a particular point not longer than one or two days. A great number of spawning fish is then usually to be taken. The fishermen maintain that these spawning days occur regularly each year and at nearly corresponding times; and it is of interest to record that the writer, three months before his visit, was told by Mr. Reuben Anderson of Delaware City the exact day when ripe fishes were to be taken. Thereafter, although »runners« are brought in intermittently it has proven most difficult to secure at the same time the spawning males and females. The later fishes are in the majority of cases spent (»slunkers«).

The breeding habits of the sturgeon have been observed in a locality a few miles below Delaware City. Here when formerly very abundant the fish were known to come into shallows noted for swift running current and clean shelly bottom, and would be seen depositing their eggs. This would occur, according to fishermen, about the beginning of May and continue for three or four days. The spawning fish is said to have been attended by several »bucks« (males), and frequently pressed on its side as the eggs were extruded. This testimony appears trustworthy as the males are clearly to be distinguished by their smaller size; and the fishes' white abdomen might readily be conspicuous. This habit is the more probable since spent fishes, in every case as far as the writer is aware, are abraided, often severely scratched, on the ventral side. On these natural grounds the eggs were repeatedly found, glued sometimes to submerged twigs, often to stones and shells, in patches, sometimes string-like but never in masses. Recently, however, no spawning in shallows appears to have been observed. The eggs that are occasionally taken are attached in stringy patches to sunken nets or water soaked brush fragments from the region of the river's channel.

The channel region seems, accordingly, best adapted for trials in artificial propagation — and this inference the results of the writer seem strongly to emphasize. In one experiment, for example, where a half-dozen hatching boxes containing eggs similarly conditioned

were arrayed from river margin near the mark of low water out to near the channel, the eggs of marginal waters speedily died while those of deep water in large part (90—95%) were safely hatched.

The arrangement of the eggs in thin layers, moreover, was found a condition necessary for aeration. This mode, unfortunately, is not easily attained. The eggs soon after fertilization become viscid, and unless speedy care be given will shortly glue together in a dense jelly-like mass. Of this the inner and poorly aerated eggs speedily die, and their disintegration appears to cause the destruction of all. It is clear, therefore, that in the disposition of the adhesive eggs upon the hatching trays the greatest promptness is required. As a detail of this process the eggs were found to be most conveniently spread when under water: a mass of eggs placed upon the submerged tray a few minutes after fertilization is readily to be floated out into a single layer, and may thus be held till attached (about 20 minutes later). In the experiments of the writer the most favorable material for tray bottom proved to be a coarse mosquito netting. On this a single layer of eggs was easily arranged, the meshes of the netting proving sufficiently large to allow eggs to enter and become favorably attached, but not large enough to allow the eggs to pass through: a well prepared tray bottom thus received on either side the best conditions for aeration.

Floating hatching boxes with bottom and ends of fine metal gauze were found to give satisfactory results. Space was economized by making the box a deep one, placing the hatching trays almost vertically, allowing four or five to a box. If the trays be slightly inclined downward against the direction of the current they are naturally less apt to suffer from deposits of silt.

Under natural conditions the hatching of eggs took place (water temperature 60°—73° F.) between 92 and 100 hours.

4. Laubfrosch und Wetter.

Von R. v. Lendenfeld (Czernowitz).

eingeg. 4. November 1893.

Ich habe diesen Herbst in der Zeit vom 25. Juli bis zum 18. October zehn *Hyla*-Exemplare zu dem Zwecke gehalten und beobachtet, um zu eruieren ob und in welcher Weise das Auf- und Absteigen der Laubfrösche durch meteorologische Verhältnisse beeinflußt wird.

Den Fröschen wurde eine zehnsprossige Leiter gegeben und die Nummern der von unten nach oben 1 bis 10 bezeichneten Sprossen mit der Zahl der auf ihnen — oder in gleicher Höhe am Glas — sitzenden Frösche multipliciert; diese Zahlen wurden addiert und ein-