

DIFFERENCES BETWEEN MEASUREMENTS OF LIVING AND  
PRESERVED AQUATIC NYMPHS CAUSED BY  
INJURY AND PRESERVATIVES

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Many attempts have been made to determine the growth of populations of aquatic insects by making measurements of certain body dimensions of the individual nymphs. Probably the most used measurement has been that of body length.

While trying to determine the growth rate of the mayfly, *Ephemera simulans* Walker, in Lake Erie, it was found that body length of some preserved specimens varied greatly from body length of live specimens. The variation appeared to be very pronounced if the specimens had been injured. This was also true, however, in some cases where no injury was apparent. The nymphs had already been killed and fixed in KAAD (Peterson 1948, p. 6) and preserved in 95% alcohol. Therefore, in order to get a reliable index of growth, it was necessary to find some structure on the nymphs that was easy to measure and showed little change when preserved.

To estimate the differences between measurements of live vs. preserved specimens, two groups of live *Ephemera simulans* nymphs were collected. In the first group of 23 live specimens, four measurements were made of each. These were killed and fixed in KAAD for 24 hours then transferred to 95% alcohol. After 7 to 10 days they were again measured, and the results compared with the first measurements. The second group of 20 specimens was treated in the same manner as the first group, with one exception. Each specimen after being measured alive was injured by slightly crushing the thorax or abdomen or by piercing the body with a pin to simulate injuries which occur while making regular collections.

The average of each of the four measurements in each group is given in Table I.

The table shows that the total length variation is several times greater than that of the other measurements. On uninjured specimens KAAD has a tendency to slightly increase the length, while injured specimens become greatly telescoped, thus giving an average difference in

TABLE I. Average Measurements (in mm.)  
Made on Two Groups of *Ephemera simulans*  
Nymphs Before and After Being Killed and  
Preserved.

	Eye diameter	Rostrum length	Head width	Total length
23 Uninjured Specimens				
Living.....	.5890	.6224	1.4006	15.697
Preserved.....	.5979	.6290	1.3808	16.353
Difference.....	.0089	.0066	.0198	.656
Difference as per cent of live measurement*....	-1.51	-1.06	+1.41	-4.18
20 Injured Specimens				
Living.....	.5941	.6626	1.3839	15.560
Preserved.....	.6137	.6528	1.3863	13.642
Difference.....	.0196	.0098	.0024	1.918
Difference as per cent of live measurement*....	-3.30	+1.48	-0.17	+12.33

\*Negative differences indicate that living specimens were smaller

length of 16.51% (4.18% + 12.33%) between the injured and uninjured preserved specimens. Rostrum length and eye diameter show only small variations, but are difficult measurements to make because of size and indefinite index points. The head width in these specimens is easy to measure and is large enough to give reliable data. Also, the head width shows very little variation. The head of a mayfly nymph is heavily chitinized and more or less fused together; therefore, it is not surprising that it should show less variation than the soft parts such as the thorax and the abdomen. However, another study, not yet completed, shows a general correlation between head width and body length. By using head width instead of body length, the measurements of the injured specimens are as reliable as those of the uninjured. This is especially important where the collections are small.

It was concluded that, for *Ephemera simulans* specimens killed in KAAD and preserved in 95% alcohol, the head width offered a more

reliable index of growth than did the other measurements. Total length was found to be the least reliable.

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REFERENCES

Peterson, A. 1948. Larvae of insects, an in-