A Device for Holding Objects in the Stomachs of Fish

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A Device for Holding Objects in the Stomachs of Fish

Studies were initiated in 1962 which involved holding objects in the stomachs of fish for extended periods of time. To accomplish this, it was necessary to construct a device which would withstand regurgitating actions without inflicting injury, and would not disrupt the normal behavior of the fish. This device consisted of a plastic rod that was attached to the isthmus of the fish and extended down the gullet into the stomach.

The method required the shaping of a Halon$^1$ resin rod 0.0625 inch in diameter into a loop to fit around the isthmus of the fish. Halon was used because of its apparent lack of toxicity, its plasticity after moderate heating and its flexibility. The proper fit of the loop around the isthmus was important to prevent irritation and wearing away of the isthmus tissues. The proper size and shape of the har-

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$^1$ Manufactured by Allied Chemical Corporation, Plastics Division, 1 River Road, Edgewater, New Jersey.
ness was determined as follows. A fish of the
desired species and body length was dissected
and a balsa wood model was carved so that its
cross section matched that of the isthmus be­
tween the first and second gill arches. One
end of the Halon rod was then heated and a
loop having a plane perpendicular to the long
axis of the rod was formed around the ap­
propriate model. The opposite end of the rod
was trimmed to extend the desired distance
into the stomach and the object to be im­
planted in the stomach was attached. The ap­
paratus was easily installed in the anesthetized
fish by inserting the rod down the gullet and
manipulating the loop around the isthmus be­
tween the first and second gill arches. Toler­
ance by the fish to this harness is indicated by
the following observations.

The effects of these devices on feeding
activity of northern pike, *Esox lucius*, was
studied over a 51-day period. Twenty north­
erm pike, 406 to 616 mm total length, were
selected; 15 were fitted with harnesses to
which various metals were attached, five fish
were used as controls.

The experimental fish fitted with harnesses
and metals attempted to expel the harnesses
within a few hours after attachment. They
were observed to open their mouths widely
and to shake their heads rapidly from side
to side. This behavior was observed infre­
quently after the first day. The control fish
did not behave in this manner although they
also had been anesthetized.

The fish were held individually in concrete
and glass tanks of approximately 175-gallon
capacity containing creek chubs, *Semotilus
atromaculatus*, which were replaced as rapidly
as the northern pike ingested them. There was
no difference in the mean rate of feeding be­
tween fish in the control group and the experi­
mentals, both of which consumed about one
creek chub per northern pike each 5 days.
Throughout the study there was some regurgi­
tation of partially digested fish remains by
northern pike in the three experimental groups;
however, control fish regurgitated at the same
rate.

Upon completion of the feeding study, four
northern pike fitted with harnesses and metals
were placed in a 0.1-acre pond with suitable
forage fish. Three northern pike were subse­
quently recovered from the pond. The first
test fish was removed and examined 87 days
after it had been fitted with a harness. This
fish was in poor physical condition and showed
extensive erosion of tissue where the harness
was attached. A second northern pike was re­
moved from the pond and examined after
carrying the harness for 164 days. This fish
appeared to be in good physical condition ex­
ccept that the isthmus showed wearing away
of the tissues on the ventral surface. A third
northern pike was recaptured 226 days after
the harness was attached. This fish also ap­
ppeared to be in good physical condition. Al­
though initially there had been wearing away
of the tissues on the ventral portion of the
isthmus, this had healed and no further wear
had taken place. Apparently there had also
been some irritation where the rod entered the
gullet as the tissue of the ventral portion of the
isthmus had grown around the rod for a length
of 20 mm. No inflammation of the isthmus,
gullet, or the stomach was apparent at the time
of recapture.

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