Nov. 26, 1979 issue of NUCLEARFUEL (a McGraw-Hill newsletter) explained that unforeseen instabilities had developed in the commercial nuclear-fuel market "as a result of government intervention in pursuit of national policies and objectives."

It's not fair to withhold fuel supplies from signers and abiders of the Nuclear Nonproliferation Treaty, the INFCE report seems to say, even though the report goes on to suggest that a nation's signing of the Treaty may be insufficient to ensure that it will not develop the wherewithal to produce nuclear weapons; yet the U.S. position on that issue, according to documents reported on in the Dec. 24 NUCLEARFUEL, indicates that the United States would flatly oppose negotiation of universal conditions to assure nuclear supplies.

One reason the United States might be assuming this posture is suggested in a report commissioned by the U.S. National Security Council and authored by Albert Wohlstetter and Henry Rowen. Their report says only two nations — the United States and the Soviet Union — are capable of stabilizing developing political conflicts that threaten to cut off future oil supplies from the Mid East. Europe relies on the Mid East for half its oil, the pair claim. Therefore, Rowen and Wohlstetter suggest that the United States might profitably peg a promise to secure those oil supplies — with a beefed up U.S. military presence in the Mid East — in exchange for an agreement by the United States' European allies that they shift their current pro-breeder-development stance to one more consistent with the deferred-breeder-development policy Carter advocates.

Although the United States disagrees with the aggressive breeder-reactor development pursued by France, West Germany and Britain, it has basically done less than it could to discourage them, Rowen and Wohlstetter claim, according to the Oct. 1 NUCLEARFUEL. This may in fact signal a shift in U.S. State Department policy, they charge — from one opposing breeder commercialization in general to one opposing breeder commercialization only in developing countries. If so, that is not an attitude that is likely to set well with the large number of developing countries that hope to "go nuclear" in the next few years.

An Iranian nuclear-power official explained to SCIENCE NEWS two years ago what may sum up the developing nations' attitude: "If you don't sell us your reactors with your safeguards today, you'll force us to develop our own. It will take us 10 years longer to do it ourselves, but then you won't be able to touch us with your nonproliferation diplomacy."

So what in all this makes INFCE a success? First, it exorcised the myth that nuclear power and weapons are unrelated. Second, it brought nuclear supplier and importer nations together in a forum where the sobering issues of economics and safeguards were addressed by all. □

Found: Tooth-making genes in chickens

Chicken teeth have been coaxed out of their evolutionary hiding place by scientists using tissue transplant techniques. Edward J. Kollar and Christopher Fisher of the University of Connecticut School of Dental Medicine have produced four complete teeth derived substantially from chick embryonic tissue. They believe their achievement indicates that the genes for making teeth were not lost from birds' repertoire during evolution, but rather that change in the pattern of embryonic development rendered those genes silent and all birds toothless.

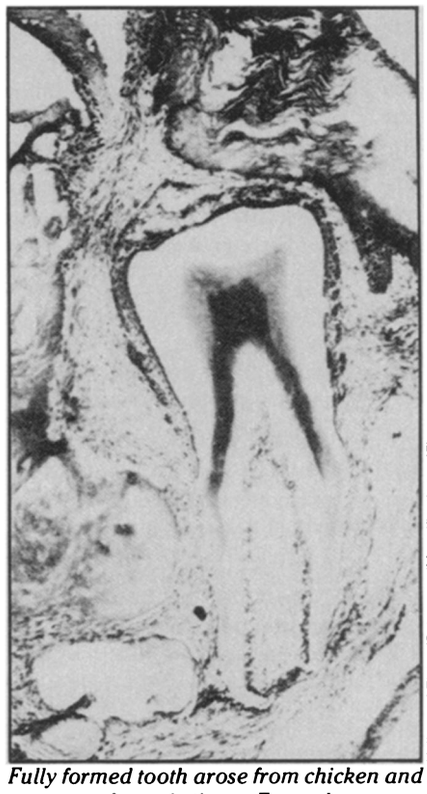
"The absence of teeth in chickens can be viewed as an evolutionary birth defect," Kollar says. Events during early development prevent the tooth-making genes from functioning. In recent experiments Kollar and Fisher provided conditions that allow those long-quiescent bird genes to express their potential.

In toothed animals, two types of embryonic tissue participate in dental development. One type, the mesenchyme, differentiates into cells that form the basic tooth structural material called dentin. The other type, the epithelium, provides cells that lay down enamel on the teeth. Each tissue is dependent on the other. No enamel is made without mesenchyme, and no dentin forms if the epithelium is absent.

To demonstrate bird epithelium's genetic ability to make tooth enamel, and to trigger dentin formation, Kollar and Fisher dissected epithelium from the lower face area of 5-day-old chick embryos and layered it on top of mesenchyme from the tooth buds, the earliest rudiments of molars, from 16- to 18-day-old mouse embryos. The mouse-chick tissue packet was grafted into the cavity between the cornea and iris of the eye of an adult mouse. Blood circulation there nourished the implanted tissue, so it could grow for weeks.

"The eye chamber is the trick," Kollar says, to explain the success of these experiments. Almost 10 years ago he did experiments with chick and mouse tissues in laboratory culture that suggested the existence of chick genes for tooth formation. The tissues produced an "enamel organ-like arrangement," but they could not be kept alive long enough to develop a fully formed tooth. "We had to wait for nude athymic mice to be developed," Kollar says. These mice serve as ideal hosts for maintaining experimental tissues; they provide blood but because they lack a thymus gland they do not mount an immune attack on grafted foreign tissue.

The tooth arising from the grafted chick and mouse tissues meets Kollar's expectations of what a bird tooth should be like. In the most visible sample, the tooth does not have the cusp pattern characteristic of mammalian molars, but more closely resembles reptile teeth. "Primitive teeth [in lower animals] are more peg-like, they have a smoother surface," Kollar says.



Kollar and Fisher/Science (Magnification x 45)

Fully formed tooth arose from chicken and mouse embryonic tissue. Enamel was provided by chicken cells.

The scientists do not yet know whether tooth enamel produced by chick and mammalian cells is chemically distinguishable, but newly available antibodies to the enamel protein may resolve that question. Kollar expects there to be little difference between the enamels. He says that as a consequence of their survival importance, teeth are very highly conserved during evolution.

Evolutionary hints of the possibility of bird teeth have long fascinated Kollar. "Reptilian teeth were beautiful. What happened?" he asks. Work by others almost forty years ago indicated that a dental mandible starts to form naturally in early chick embryo, then disappears. That suggested to him that a shortcoming during development halts tooth formation. Kollar suggests that the architecture of the bird head, perhaps as it changed to allow for a beak, interfered with the interactions, between embryonic epithelium and mesenchyme, required for teeth.

Kollar sees his finding as support for the idea that evolution moves in broad changes — for instance, involving interactions during development — rather than in tiny genetic steps. With recently developed genetic and tissue transplant techniques, students of evolution may soon obtain as much information from history coded in the genetic material of living creatures as they do from the preserved traces of those long dead. □