

fishes without superfoetation in transient environments characterised by low levels of predation and competition, and consequently high adult survivorship. Although the mechanics of the model seem sound, its theoretical applicability breaks down on examination of the biology of poeciliid fishes.

In the Rio del Fuerte of north-western Mexico, *Poeciliopsis monacha* inhabits small pools in headwater arroyos carved in solid bedrock. The raging torrents of the rainy season revert in the dry season to congested and isolated pools of a few litres of water. Fishes become compacted, are heavily parasitised and appear emaciated. Aquatic arthropod and reptilian predators are abundant, imposing

and J. Schultz, unpublished). Superfoetation does not seem to be an adaptation solely to transient environments; levels of superfoetation, instead, seem correlated with increased stability and decreased levels of competition. Moreover, approximately 85% of the species of poeciliids lack superfoetation which further attests to the flexibility of the more common and more widely distributed reproductive mechanism.

Further, there is no reason to assume that superfoetation reduces the peak cost of reproduction. Some *Poeciliopsis* have evolved high degrees of maternal contributions to developing embryos with pseudoplacentas (R.T. and J.S., unpublished). The maintenance of several

lomas. Further studies in our laboratory and in others showed that these conclusions were not correct.

The new data showing our misinterpretation were as follows. First, when TdT activity is determined in partially purified extracts from thymus, the highest activity is observed in the presence of oligo (dA) as primer, and of dGTP as substrate. When myeloma extracts were used, no activity was detected with this combination. In our previous study, the TdT activity was determined using d(pT)₄ with dATP or dTTP; this system seems to have very low efficiency. Second, further studies of the profile of the activities on the phosphocellulose chromatograms with thymus extracts showed an overlapping, but not an exact correspondence of the peaks obtained with oligo (dA)/dGTP and with d(pT)₄/dATP. The d(pT)₄/dATP activity was not modified in the thymus after hydrocortisone treatment of mice. It was recently shown that TdT is drastically decreased in these conditions^{2,3}.

Therefore, the activity we described¹ does not correspond to terminal deoxynucleotidyltransferase, but to another deoxynucleotide-polymerising enzyme, the nature of which remains to be determined.

We thank D. Baltimore, R. MacCaffrey, T. A. Harrison, P. C. Kung and A. E. Silvertone for help in the analysis of myeloma and thymus activities which led us to the correct interpretation of our results.

CLAUDE PENIT
ALAIN PARAF
FRANCOIS CHAPEVILLE

*Institut de Biologie Moleculaire,
Paris, France*

¹ Penit, C., Paraf, A., and Chapeville, F., *Nature*, 249, 755-757 (1974).

² Kung, P. C., Silverstone, A. E., McCaffrey, R. P., and Baltimore, D., *J. exp. Med.*, 141, 855-865 (1975).

³ Bollum, F. J., *Fedn Proc.*, 34, 494 (1975).

Double helix of tropomyosin

LONGLEY¹ has suggested that the supercoil pitch length (*P*) of tropomyosin (TM) may be 114 Å. The arguments in favour of this value are based on the assumptions that TM molecules are optimally packed in the tactoids formed using Mg²⁺ and Ca²⁺ (ref. 2) and also that TM presents an axially and azimuthally pseudo-equivalent aspect to consecutive actin molecules.

Although it is known^{3,4} that two-stranded ropes may pack optimally when there is a relative axial stagger of *P*/4, it remains to be shown that TM packs in this way in Mg tactoids. Indeed, the Mg

Table 1 Calculation of *r* for populations of fishes with and without superfoetation

(10 d interval)	With superfoetation		Without superfoetation	
	<i>m_x</i>	<i>l_x</i>	<i>m_x</i>	<i>l_x</i>
1	0	1.00	0	1.00
↓	↓	↓	↓	↓
8 (First reproduction)	10	<i>p</i> - <i>n</i> ₁ (0.025)	20	<i>p</i> - <i>n</i> ₁ (0.025)
9	10	<i>p</i> - <i>n</i> ₂ (0.025)	0	—
10	10	↓	20	<i>p</i> - <i>n</i> ₃ (0.025)
11	10	↓	0	—
12	10	↓	20	↓
13	10	↓	0	—
14	10	↓	20	↓
↓	↓	↓	↓	↓
<i>i</i>	<i>m_i</i>	<i>p</i> - <i>n_i</i> (0.025)	↓	<i>p</i> - <i>n_i</i> (0.025)

n, Integer values from 0 to *j*.

As *p* → 0.8 (high survivorship), *r* → 0.37

As *p* → 0.3 (low survivorship), *r* → 0.32

r → 0.41.

r → 0.37.

l_x, age-specific survivorship; *m_x*, age-specific fecundity; *p*, survivorship adjustment factor to determine survivorship at each interval.

predation pressure on all size classes of *Poeciliopsis*². Conjecture that these environments are characterised by low levels of intraspecific competition and predation and high adult survivorship, is unfounded.

Downstream from headwater environments, the Fuerte broadens and is somewhat stable with a diversity of lentic and lotic habitats. Inhabited by *P. lucida*, these tributaries are home to an equally diverse array of aquatic predators as well as avian predators. The robustness of fishes in this habitat reflects reduced levels of competition. These tributaries drain into the main stems of the Fuerte with deep and flowing permanent water and stable temperature regimes. Superfoetated *P. prolifica* is found in these environments.

In terms of stability, stream size, and competition levels, the habitat of *P. monacha* lies at one extreme, being transient with competition pronounced. The environment of *P. prolifica*, in contrast, is stable with low levels of competition. The environment of *P. lucida* is intermediate in these characteristics. Predation pressure is variable among the environments. Populations of reproducing *P. monacha* average 1.4-1.5 broods per female developing simultaneously; *P. lucida*, 1.8-2.0; and *P. prolifica* 4-5 (R.T.

broods, each with specific nutritive and metabolic demands, may instead enhance the cost of reproduction.

In extending a hypothetical life table (Table 1) to enable calculation of *r* (the intrinsic rate of increase³), fishes without superfoetation have a slight advantage. Regardless of female survivorship, the ability to produce a large number of young in the initial reproductive period may be adaptive in transient environments where *r* selection is operative.

Superfoetation must convey some evolutionary advantages to viviparous fishes; however, the causative selective force, to me, still remains an enigma.

Bowling Green State University.

¹ Downhower, J., and Brown, L., *Nature*, 256, 345 (1975).

² Thibault, R., thesis, Univ. Conn. (1974).

³ Birch, L., *J. Anim. Ecol.*, 17, 15-26 (1948).

Terminal deoxynucleotidyltransferase in murine myelomas

WE have published¹ results suggesting the presence of terminal deoxynucleotidyltransferase (TdT) in murine mye-