Similarity in membrane proteins

SIR—Adams and Pollard[1] recently discovered that the nonfilamentous myosins IA and IB of *Acanthamoeba* can bind to membranes, a finding with important implications concerning the role of these proteins in cell motility. We would like to draw attention to a 50-amino-acid domain in the sequence of the myosin-IB isozyme[2] that is shared with a diverse family of cytoplasmic proteins, many of which are associated with the plasma membrane (see figure). This domain, called SH3 or the A-box, was first described as a region of sequence similarity between the non-receptor protein-tyrosine kinases, the 148K phospholipase C (PLC), and the v-*crk* oncogene of the avian sarcoma virus CT10 (refs 3 and 4). It was subsequently found in the α-chain of the non-erythroid spectrin homologue, fodrin[5].

Our database searches have also revealed SH3 domains in cdc25 and fus1, indicates a basic function common to all eukaryotes but this function is still a mystery. Although SH3 is found in many proteins at the cell periphery, it is not universal; it is absent from erythroid spectrin for instance.

Adams and Pollard[1] mapped the membrane-binding region of myosin-IA to a 100K N-terminal chymotryptic fragment, but the binding region of myosin-IB has not yet been localized. Intriguingly, the SH3 domain of the IB protein is close to the protein's ATP-independent actin-binding site[8]. It will be interesting to see whether the SH3 domains of myosin-IB and other proteins play a role in binding either directly to membranes or to the submembrane cytoskeleton.

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			ref.
Myosin-1B	(983)	ALYDFAAENPDE-----LTFNEGAVVTVI-NKSNPDWWEGEL----NGQR-GVFPASYVELI-PR	ref.2
Fodrin-α	(974)	ALYDyqeksPrE-----vTmkkGdiITII-NstNkDWWkvEv----Ndrq-GfvPAaYVkkI-dp	5
PLC148	(798)	ALfDykAqreDE-----LTFtksAiiqnv-eKqeggWWrGdyh---hkkq-IwFPsnYVEemv-s	3
v-Crk	(375)	ALfDFkgnddgd-----LpFkkGdiIkir-dKpeeqWWnaEdm---dGkR-GmiPvpYVEkcrPs	4
c-Fgr	(84)	ALYDyeArteDd-----LTFtkGekfhiI-NntegDWWEarsIs--sGkt-GciPsnYVapv-ds	9
Lsk	(67)	ALhsyepshdgd-----LgFekGeqIrii-eqS-geWWkaqsIt--tGQe-GfiPfnfVaka-ns	10
c-Yes	(97)	ALYDyeArtted-----LsFkkGerfqiI-NntegDWWEarsIa--tGkn-GyiPsnYVapa-ds	11
Hck	(62)	ALYDyeAihred-----LsFqkGdqmvVI-eea-geWWkarsIa--tke--GyiPsnYVarv-ns	12
c-Src	(88)	ALYDyesrtetd-----LsFkkGerIqiv-NntegDWWIahsIt--tGQt-GyiPsnYVaps-ds	13
c-Abl	(68)	ALYDFvAsgdnt-----LsitkGekIrVIgynhNgeWcEaqtk---NGQ--GwvPsnYitpv-ns	14
fus1	(443)	viqDyeprItDE-----irisIGekvkiI-athtdgWcIvqkc---NtQk-GsihvSvddkryIn	6,7
cdc25	(64)	AaYDFnypikkdsssqILsvqqGetiyiI-NKnssgWWdGIviddsNGkvrGwFPqnfgrpIrds	15
Consensus		ALYDY------D-----Φ-Φ--GD-Φ-ΦΦ-------WW------------GΦΦP--YΦ------	
		F F E E F	

Upper-case letters denote identity with the myosin-IB sequence. The amino-acid number of the first residue of each sequence is given in parentheses. φ signifies hydrophobic residues. The PIR database was searched using the programs Prosearch (J. Collins and A. Coulson, University of Edinburgh) on an AMT DAP, and AMPS (G. Barton and M.J.E.S.) on a VAX 8700; the Genepro program (Riverside Scientific, Seattle) was used to search the EMBL database.

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Retrocitation

SIR—In my News and Views article "Reverse Transcriptases. Retrons in Bacteria" (ref. 1) I stated "no such reverse transcriptase seemed to exist in bacteria". M. Beljanski has since called my attention to his publications on reverse transcriptase in bacteria[2–5]. This work was confirmed in several Soviet publications[6–9]. It will be of interest to see if these activities are related to retrons.

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What are males good for?

SIR—Successful rearing of young in most birds requires the care of two adults. Such parental pairs are almost always a male and a female, but the discovery of female/female pairings in one tern, one goose and several gull species, discussed by Jared Diamond[1], demonstrates that other parental pairing combinations are possible. Female/female pairs are, nevertheless, rare even in these few species[2–6]. Determining the reasons why they are so uncommon may help to formulate answers for the old question 'What are males good for?'

The most obvious benefit to females of pairing with a male — access to a source of sperm — is probably not of primary importance, as females paired together still copulate with unmated and mated males[7]. Female/female pairs, therefore, produce fertile eggs, although their fertility rates may be less than those of male/female pairs[4–6].

Perhaps a more important advantage provided by males is that of a territory. Female birds are generally smaller than males, and may, therefore, be at a disadvantage when competing against a male for a territory. In all the colonies where I have found female/female pairs or the unusually large (5–7 egg) clutches that result from them[2,8] (eight ring-billed gull colonies, four California gull colonies and a Caspian tern colony), space for more nesting pairs was available on the nesting islands. In western gulls, female/female pairs were found in one colony where there was little competition for breeding space, but no such pairs were found in another colony where breeding space was limited[9].

Probably the most important advantage a female derives from pairing with a male is the opportunity to raise only her own young (nest parasitism aside). By contrast, each female in a homosexual pair will contribute, on average, only half the young. An unrelated pair of females must, therefore, produce twice the offspring of a heterosexual pair before the reproductive output of each homosexually paired female equals that of a

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