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Elongation factor 1 contains two homologous guanine-nucleotide exchange proteins as shown from the molecular cloning of beta and delta subunits

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Elongation factor 1 mediates the elongation step of mRNA translation. The transfer of aminoacyl-tRNA to ribosomes under hydrolysis of GTP is catalyzed by a GTP binding protein, EF1α. A guanine-nucleotide exchange complex now referred as EF1$\beta\gamma\delta$ replaces GDP by GTP on EF1α (1). A complex, purified from *Xenopus* oocytes as a substrate for the meiotic and mitotic $p34^{cdc2}$ kinase, was shown to contain the guanine-nucleotide exchange activity (2). The *Xenopus* complex is composed of three main proteins, p30, p36 and p47. Surprisingly, microsequencing of two of its components, p36 and p30 suggested the presence of two related proteins (2). We have previously cloned and sequenced the cDNA encoding for p47 or EF1γ (3) and p36 or EF1δ (4), we present here the molecular cloning of p30 or EF1β. This result allows for the first time, sequence analysis of EF1β and δ proteins, both present in the same complex.

A λgt11 *Xenopus* ovarian library was screened with a polyclonal antibody raised against the EF1$\beta\gamma\delta$ *Xenopus* complex. A clone encoding for EF1β was isolated. The insert (811 bp) was subcloned into pBluescript KS II phagemid and sequenced in both directions using standard techniques (5) (Figure 1A). The encoded protein, of 227 amino acids length, was identified to EF1β by the presence in the cDNA-deduced sequence of all peptides found by the microsequencing of purified p30 protein (Figure 1B). A putative phosphorylation site for casein kinase II was found at ^{108}Serine, matching the one identified in the corresponding protein of Artemia (6). Interestingly, sequence identity was high between the C-terminal domain of the EF1β protein (100−227) and the C-terminal domain of EF-1δ protein (85%) i.e. in the domain containing the guanine-nucleotide exchange activity (7). The 1−100 N terminal part of EF1β appears clearly unrelated (13% identity) to that of EF1δ. The presence of two different guanine-nucleotide exchange proteins in the same complex questions their respective physiological roles, which could be related to their specific N-ter domains.

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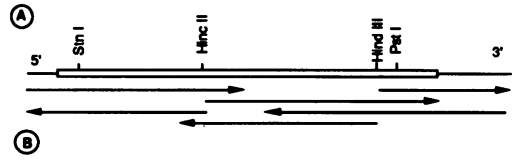


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MGFGDLKSPAGLKVLKHFLADKSYIHGYVPSQADVAVFDA  40
LSAAPPADLFHALRWYNHIKSYEKQKSSLPGVKKALGNYG  80
PVNIEDTTGSAAKETKEEDDDDIDLFGSDDEEESEDAKRV 120
RDERLAQYEAKKSKKPTLIAKSSILLDVKPWDDETDMGKL 160
EECLRSIQMDGLLWGSSKLVPVGYGIKKLQIQCVVEDDKV 200
GTDVLEHKITAFEDFVQSMDVAAFNKI               227
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Figure 1. A. — Sequencing strategy: Arrows indicate length and direction of sequences. **B** — cDNA-deduced amino acid sequence: White boxes: peptides obtained by sequencing of the protein.

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