

# Article: On the Origins of Chemical Biodefense

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  - *Date:* Sun, 16 Oct 2005 01:41:04 -0400 (EDT)
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On the Origins of Chemical Biodefense

The following points are made by R. Liddington and L. Bankston (Nature 2005 437:484):

1) Before antibodies evolved, primitive multicellular organisms devised a general defense system against bacterial and viral invaders called "innate immunity". The system has survived in vertebrates with its core components little changed during the intervening 700 million years[1]. A central element of this defense strategy is an activated thioester — a molecular warhead — that is today used only in this setting, perhaps because it is potentially so destructive. The protein C3, a member of a small family of related proteins carrying this warhead, is a large molecule of the "complement" system, which identifies foreign agents and targets them for destruction. New work presents the atomic-resolution crystal structure of C3, as well as that of an inactivated fragment, C3c.

2) From the structure of C3, it is immediately apparent how this large multi-domain protein evolved from a series of simpler building-blocks into a tightly regulated killing machine. First, the core of C3 is composed of eight copies of a simple three-dimensional motif, which Gros et al term "macroglobulin" (MG1-MG8), arranged in tandem. The presence of these repeated domains suggests that the core arose through duplications of a primordial gene that originally encoded a single domain. Random mutations occurring over hundreds of millions of years mean that the component amino-acid sequences of individual domains no longer share any similarity; nevertheless, their evolutionary origin is preserved in their three-dimensional structure.

Full text at ScienceWeek  
<http://scienceweek.com/2005/sw051021-5.htm>

Posted by  
Robert Karl Stonjek

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- *Follow-Ups:*

- ◆ ***Re: Article: On the Origins of Chemical Biodefense***

- ◇ *From:* jimmenegay

- ◆ ***Re: Article: On the Origins of Chemical Biodefense***

- ◇ *From:* Larry Moran

- Prev by Date: ***Re: Southampton strategy***

- Next by Date: ***PIP you may like this study***

- Previous by thread: ***testosterone in females***

- Next by thread: ***Re: Article: On the Origins of Chemical Biodefense***

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