spliced. This result suggests that *trans*-splicing does not precede 3′-end processing. Most likely, polyadenylation and *trans*-splicing will prove to be concerted reactions.

Cis-splicing of conventional introns seems to occur independently of either *trans*-splicing or 3′-end processing. In both the *mai-1/gpd-2* and *gpd-2/gpd-3* partially processed bicistronic transcripts, the internal introns had already been excised, even though cleavage and polyadenylation of the upstream gene and *trans*-splicing to the downstream gene had not occurred.

We are left with several questions, for instance whether clustering of genes into operons in *C. elegans* conserves space in the small genome. In turn, this raises the issue as to the direction in which evolution is proceeding. Is the *C. elegans* genome becoming more compact to achieve bacterial status, or is it expanding towards the higher eukaryotic monocistronic design with each gene preceded by its own set of transcriptional regulatory sequences? Perhaps *trans*-splicing and operons will also be found in those higher organisms with particularly compact genomes.

There is also the matter of whether the function of SL2 *trans*-splicing is limited to cleaving polycistronic mRNAs to monocistronic units. *Trans*-splicing of both SL1 and SL2 provides a defined 22-nucleotide sequence at the 5′ ends of the processed transcripts. The current bet is that these spliced leaders also act as good translational initiation sites, although other functions are possible (nuclear export or protection of mRNA from degradation, for instance). From the database, it appears that about 30 per cent of the genes do not use *trans*-splicing. It will be interesting to see if their 5′ ends already have good translational initiation regions, and how the sequences compare to those of spliced leaders. □

David Hirsh is in the Department of Biochemistry and Molecular Biophysics, College of Physicians and Surgeons of Columbia University, 630 West 168th Street, New York, New York 10032, USA.

1. Spieth, J., Brooke, G., Kuersten, S., Lea, K. & Blumenthal, T. *Cell* **73**, 521–532 (1993).
2. Zorio, D. A. R., Cheng, N. N., Blumenthal, T. & Spieth, J. *Nature* **372**, 270–272 (1994).
3. Johnson, P. J., Kooter, J. M. & Borst, P. *Cell* **51**, 273–281 (1987).
4. Krause, M. & Hirsh, D. *Cell* **49**, 753–761 (1987).
5. Conrad, R., Thomas, J., Spieth, J. & Blumenthal, T. *Molec. cell. Biol.* **11**, 1921–1926 (1991).
6. Conrad, R., Liou, R. F. & Blumenthal, T. *EMBO J.* **12**, 1249–1255 (1991).
7. Huang, X.-Y. & Hirsh, D. *Proc. natn. Acad. Sci. U.S.A.* **86**, 8640–8644 (1989).
8. Kuwabara, P. E., Okkema, P. G. & Kimble, J. *Molec. Biol. Cell* **3**, 461–473 (1992).
9. Huang, X.-Y. *et al. J. molec. Biol.* **206**, 411–424 (1989).
10. Huang, L. S., Tzou, P. & Sternberg, P. W. *Molec. Biol. Cell* **5**, 395–412 (1994).
11. Clark, S. G., Lu, X. & Horvitz, H. R. *Genetics* **137**, 987–997 (1994).
12. Sulston, J. *et al. Nature* **356**, 37–41 (1992).
13. Wilson, R. *et al. Nature* **368**, 32–38 (1994).

CONSERVATION BIOLOGY

How to help the corncrake

William J. Sutherland

THE rasping nocturnal call of the male corncrake, *Crex crex*, would have been familiar to most European country-dwellers in the nineteenth century. Now, however, the range of the species has diminished to such an extent that it is endangered. This elusive bird is still widespread in Europe, so it was appropriate that a workshop* held to discuss the extent of the decline and how to reverse it had a pan-continental dimension.

C H Gomersall/RSPB

Crex crex — elusive but endangered.

Thirty one nations are home to breeding populations of corncrakes, and data on population trends are available for 26 of them. Declines have occurred in the past 5–10 years in 20 of the 26, and in six countries numbers of the bird have fallen by more than half (G. Rocamora, Ligue pour la Protection des Oiseaux). The worst story comes from Ireland — there, the number of corncrakes fell by 86 per cent between 1988 and 1994, and the species has disappeared from Northern Ireland.

Corncrake populations have been falling for about 100 years in parts of western Europe, coinciding with the introduction of mechanized hay mowing. Corncrakes nest on the ground and rear their chicks in tall vegetation, so mowing is highly destructive. All large populations of corncrakes (those with over 10,000 males) now occur in countries where hand mowing of hay remains a common practice (R. Green, Royal Society for the Protection of Birds). In some areas there has also been a trend towards earlier mowing, associated with a switch from hay- to silage-making and agricultural improvement of meadows. This increases the degree of overlap between the mowing season and the time at which many nests and chicks are present in the meadows. Corncrake populations have remained stable or declined more slowly where hay is harvested late because of the local climate or a high water table (N. Schaffer, Max Planck Institute, Radolfzell).

Another problem has been loss of tall-vegetation habitats because of changes in farming. Hay meadows have disappeared from many parts of western Europe as a result of new technologies encouraged by subsidies within the European Union for maize, poplars and sheep (J. Dixon, RSPB). Subsidies for cattle have encouraged more intensive field-management, allowing earlier cutting. The large populations of corncrakes in eastern Europe are expected to succumb to similar changes when the present economic chaos and hiatus in agricultural development come to an end.

Exclusion of grazing and mowing from strips of tall vegetation, for example at the fringes of wetlands, and changes in the timing and method of mechanized mowing, are the most promising conservation approaches (T. Stowe, RSPB). Delayed mowing reduces the risk of damage to both nests and chicks. Machine mowing from the periphery of a meadow towards its centre traps chicks and adults which are reluctant to cross open ground. Between 38 and 95 per cent of chicks are killed per mowing episode, and some chicks are exposed to several such episodes during their 35-day flightless period. Mowing from the centre of the field outwards reduces the mortality rate to 8–19 per cent as chicks are able to move away from the mower to adjacent unmowed areas. After the introduction of all these practices in 1991, the corncrake population of a nature reserve on the Isle of Coll, Scotland, has increased threefold. Schemes in Ireland and Scotland involving payments to farmers to modify mowing practices are also showing signs of success: the decline has slowed or been reversed in areas with the greatest uptake of grants.

The agricultural policies of the European Union are partly to blame for the corncrake's plight, but policy mechanisms also provide potential solutions. Within the framework of reducing excess production, there is the possibility of paying farmers to manage their land more sympathetically. In selected areas, such measures would not only help the corncrake, but also reduce nitrogen fertilizer inputs and agricultural surpluses, and benefit a range of other wildlife. □

**Birdlife International European Workshop on the Corncrake, Gdansk, Poland, 25–27 October 1994.*

William J. Sutherland is in the School of Biological Sciences, University of East Anglia, Norwich NR4 7TJ, UK.