(We discuss some examples of the use of RNA-RNA interactionsin spacific control systems in other chapters, including control of translation [see Chapter 15] and replication [see Chapter 12].)

The synthesis of a small RNA directly controls translation of the ompF gene of *E. coli*. The circuit is shown in **Figure 10.44.** Expression of the unlinked genes *ompC* and *ompF*, which code for two of the outer membrane proteins of E. coli, is controlled by the osmolarity of the medium. Increase in osmolarity activates the receptor EnvZ which in turn activates OmpR, which activates expression of the regulator gene, micF.

The product of micF is an RNA of 174 bases. It is an example of an antisense RNA, which describes any RNA that blocks the function of an mRNA by virtue of complementarity with it.

Synthesis of micF RNA turns off translation of ompF mRNA. MicF RNA is complementary to a region of ompF mRNA that includes the ribosome binding site at which translation is initiated. The micF RNA could therfore function as a regulator by binding to the ompF mRNA and preventing its translation. It is also possible that formation of a duplex region destabilizes the ompF mRNA, for example, by making is susceptible to ribonucleases that act on double-stranded regions.

Figure 10.44 Increase in osmolarity activates EnvZ, which activates OmpR, which induces transcription of *micF* and *ompC* (not shown). *micF* RNA is complementary to the 5' region of *ompF* mRNA and prevents its translation.