

(100–441) and Tc1-intron (321–566) (numbers from genomic sequence). The probe used for *gfp* was *gfp1* (19–319) (numbered from ATG). Details of the probes used for analyses of Tc3 and Tc5 dsRNA are available on request. 5'-RACE analyses used the SmartII kit (Clontech), SuperScriptII reverse transcriptase (GibcoBRL) and Pwo DNA polymerase. S100H fractions were prepared as described in ref. 25. Standard procedures were used for primer-extension analyses. Sequences of all primers used are available on request. Quantification of protected fragments (RNase protection assays) was performed using ImageQuant software.

Transgenic lines

The chimeric *gfp* reporter plasmids were produced by inserting various fragments into plasmid pAZ132 (ref. 26). Plasmid pAZ1 (TIR fusion) contained nucleotides 1–54 of Tc1 (genomic sequence) in the sense orientation in the *SgrAI* site. Plasmid pAZ4 (*unc-22* fusion) contained nucleotides 11,137–11,190 of *unc-22* (spliced sequence) in the sense orientation in the *SgrAI* site. Plasmid pAZbb (TIR 3' stop) contained nucleotides 1–54 of Tc1 in the sense orientation in the *BsaBI* site. To prevent transgene silencing due to the presence of high transgene copy numbers²⁷, low-copy-number transgenic lines were generated by ballistic transformation²⁸ using a heptamer adaptor (Bio-Rad). Transformants were generated in *unc-119(dp38)* worms. All lines were selected and they were analysed for GFP expression on both wild-type (OP50) and *mut-16* dsRNA food. Worms were grown under these conditions for two generations. Lines not expressing GFP under any of these conditions were discarded; these included six TIR fusion lines, two *unc-22* fusion lines and ten TIR 3' stop lines. By DNA blot analyses (carried out according to standard procedures), transgene copy number was determined using *SacII*- and *BglII*-digested genomic DNA and *gfp*- and pBlueScript-specific probes. Crosses using *pkIs1660* showed that all three transgene copies in this line reside at one locus and segregate in a mendelian manner. However, the transgenes can be lost (presumably due to recombination), as is apparent from the presence of worms with an *unc-119* phenotype (PCR analyses confirmed transgene loss in these worms). Transgene loss is not uncommon for ballistic-generated transformants and varies for the lines as follows: *pkIs1660*, 1%; *pkIs1661*, 10%; *pkIs1662*, 10%; *pkIs1663*, 2%; *pkIs1664*, 80%; *pkIs1665*, 0%; *pkIs1666*, 1%; *pkIs1667*, 50%; *pkIs1668*, 0%; *pkIs1669*, 0%; *pkIs1671*, 0%; and *pkIs1672*, 0%. Interestingly, transgene loss strongly increases upon crossing to strains defective in transposon silencing (*mut-7* and *pk732* but not *rde-1*); this transgene loss is not dependent on the presence of the Tc1 TIR sequence, as it also occurs upon crossing *mut-7* to *pkIs1665*, an *unc-22* fusion line.

dsRNAs

Plasmids for dsRNA production in *E. coli* comprised pTS302 dsRNA¹¹ (for *unc-22*) and pTS303 (containing nucleotides 1–441 of the Tc1 genomic sequence inserted into the *SmaI* site of vector L4440 (ref. 29)). *E. coli* expressing *mut-16* dsRNA were obtained from well number 17C5 of the *C. elegans* feeding library³⁰.

Received 28 August; accepted 23 September 2003; doi:10.1038/nature02107.

- Emmons, S. W., Yesner, L., Ruan, K. S. & Katzenberg, D. Evidence for a transposon in *Caenorhabditis elegans*. *Cell* **32**, 55–65 (1983).
- Ketting, R. F., Haverkamp, T. H., van Luenen, H. G. & Plasterk, R. H. Mut-7 of *C. elegans*, required for transposon silencing and RNA interference, is a homolog of Werner syndrome helicase and RNaseD. *Cell* **99**, 133–141 (1999).
- Tabara, H. *et al.* The *rde-1* gene, RNA interference, and transposon silencing in *C. elegans*. *Cell* **99**, 123–132 (1999).
- Fischer, S. E. J., Wienholds, E. & Plasterk, R. H. A. Continuous exchange of sequence information between dispersed Tc1 transposons in the *C. elegans* genome. *Genetics* **164**, 127–134 (2003).
- Vos, J. C., De Baere, I. & Plasterk, R. H. Transposase is the only nematode protein required for *in vitro* transposition of Tc1. *Genes Dev.* **10**, 755–761 (1996).
- Plasterk, R. H. RNA silencing: the genome's immune system. *Science* **296**, 1263–1265 (2002).
- Sijen, T. *et al.* Transcriptional and posttranscriptional gene silencing are mechanistically related. *Curr. Biol.* **11**, 1–20 (2001).
- Aroian, R. V., Field, C., Pruliere, G., Kenyon, C. & Alberts, B. M. Isolation of actin-associated proteins from *Caenorhabditis elegans* oocytes and their localization in the early embryo. *EMBO J.* **16**, 1541–1549 (1997).
- Knight, S. W. & Bass, B. L. The role of RNA editing by ADARs in RNAi. *Mol. Cell* **10**, 809–817 (2002).
- Bernstein, E., Caudy, A. A., Hammond, S. M. & Hannon, G. J. Role for a bidentate ribonuclease in the initiation step of RNA interference. *Nature* **409**, 363–366 (2001).
- Sijen, T. *et al.* On the role of RNA amplification in dsRNA-triggered gene silencing. *Cell* **107**, 465–476 (2001).
- Ambros, V., Lee, R. C., Lavanway, A., Williams, P. T. & Jewell, D. MicroRNAs and other tiny endogenous RNAs in *C. elegans*. *Curr. Biol.* **13**, 807–818 (2003).
- Caudy, A. A. *et al.* A micrococcal nuclease homologue in RNAi effector complexes. *Nature* **425**, 411–414 (2003).
- Tabara, H., Yigit, E., Siomi, H. & Mello, C. C. The dsRNA binding protein RDE-4 interacts with RDE-1, DCR-1, and a DEXH-box helicase to direct RNAi in *C. elegans*. *Cell* **109**, 861–871 (2002).
- Vastenhouw, N. L. *et al.* A genome-wide screen identifies 27 genes involved in transposon silencing in *C. elegans*. *Curr. Biol.* **13**, 1311–1316 (2003).
- Tijsterman, M., Ketting, R. F., Okihara, K. L., Sijen, T. & Plasterk, R. H. RNA helicase MUT-14-

- dependent gene silencing triggered in *C. elegans* by short antisense RNAs. *Science* **295**, 694–697 (2002).
- Zamore, P. D., Tuschl, T., Sharp, P. A. & Bartel, D. P. RNAi: double-stranded RNA directs the ATP-dependent cleavage of mRNA at 21 to 23 nucleotide intervals. *Cell* **101**, 25–33 (2000).
- English, J. J., Mueller, E. & Baulcombe, D. C. Suppression of virus accumulation in transgenic plants exhibiting silencing of nuclear genes. *Plant Cell* **8**, 179–188 (1996).
- Sijen, T., Wellink, J., Hiriart, J. B. & Van Kammen, A. RNA-mediated virus resistance: role of repeated transgenes and delineation of targeted regions. *Plant Cell* **8**, 2277–2294 (1996).
- Volpe, T. A. *et al.* Regulation of heterochromatic silencing and histone H3 lysine-9 methylation by RNAi. *Science* **297**, 1833–1837 (2002).
- Reinhart, B. J. & Bartel, D. P. Small RNAs correspond to centromere heterochromatic repeats. *Science* **297**, 1831 (2002).
- Schramke, V. & Allshire, R. Hairpin RNAs and retrotransposon LTRs effect RNAi and chromatin-based gene silencing. *Science* **301**, 1069–1074 (2003).
- Fire, A. *et al.* Potent and specific genetic interference by double-stranded RNA in *Caenorhabditis elegans*. *Nature* **391**, 806–811 (1998).
- Parrish, S., Fleenor, J., Xu, S., Mello, C. & Fire, A. Functional anatomy of a dsRNA trigger. Differential requirement for the two trigger strands in RNA interference. *Mol. Cell* **6**, 1077–1087 (2000).
- Hammond, S. M., Bernstein, E., Beach, D. & Hannon, G. J. An RNA-directed nuclease mediates post-transcriptional gene silencing in *Drosophila* cells. *Nature* **404**, 293–296 (2000).
- Praitis, V., Casey, E., Collar, D. & Austin, J. Creation of low-copy integrated transgenic lines in *Caenorhabditis elegans*. *Genetics* **157**, 1217–1226 (2001).
- Kelly, W. G. & Fire, A. Chromatin silencing and the maintenance of a functional germline in *Caenorhabditis elegans*. *Development* **125**, 2451–2456 (1998).
- Wilm, T., Demel, P., Koop, H. U., Schnabel, H. & Schnabel, R. Ballistic transformation of *Caenorhabditis elegans*. *Gene* **229**, 31–35 (1999).
- Timmons, L. & Fire, A. Specific interference by ingested dsRNA. *Nature* **395**, 854 (1998).
- Fraser, A. G. *et al.* Functional genomic analysis of *C. elegans* chromosome 1 by systematic RNA interference. *Nature* **408**, 325–330 (2000).

Acknowledgements We thank R. Ketting for help in experiments and discussions, and E. Berezikov for help with the ballistic transformations. We acknowledge S. Fischer, N. Vastenhouw, V. Robert, E. Cuppen, R. May and M. Joosten for helpful discussions or for critically reading the manuscript. This work was supported by a VIDII fellowship from the Dutch Science Foundation (NWO) to T.S.

Competing interests statement The authors declare that they have no competing financial interests.

Correspondence and requests for materials should be addressed to R.H.A.P. (plasterk@niob.knaw.nl).

corrigendum

An NS3 protease inhibitor with antiviral effects in humans infected with hepatitis C virus

Daniel Lamarre, Paul C. Anderson, Murray Bailey, Pierre Beaulieu, Gordon Bolger, Pierre Bonneau, Michael Bös, Dale R. Cameron, Mireille Cartier, Michael G. Cordingley, Anne-Marie Faucher, Nathalie Goudreau, Stephen H. Kawai, George Kukolj, Lisette Lagacé, Steven R. Laplante, Hans Narjes, Marc-André Poupard, Jean Rancourt, Roel E. Sentjens, Roger St George, Bruno Simoneau, Gerhard Steinmann, Diane Thibeault, Youla S. Tsantrizos, Steven M. Weldon, Chan-Loi Yong & Montse Llinàs-Brunet

Nature **426**, 186–189 (2003).

In this Letter, the ‘Competing interests statement’ should be corrected to: ‘The authors declare competing financial interests: R.E.S. was the clinical investigator and received an honorarium from Boehringer Ingelheim. All the other authors are or were employees of Boehringer Ingelheim.’ □