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# United States Patent [19]

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[54] **RAPID IMMUNOSELECTION CLONING METHOD**

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[58] **Field of Search** ..... 435/172.3, 320.1; 536/24.2

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,675,285 6/1987 Clark et al. ..... 435/6

FOREIGN PATENT DOCUMENTS

0289949 11/1988 European Pat. Off. .
WO88/00209 1/1988 WIPO .

OTHER PUBLICATIONS

Shaw et al. (1986) Nature 323:262–264.
Yang et al. (1986) Cell 47:3–10.
Huynh et al. (1986) in *DNA Cloning vol. 1, A Practical Approach,* Glover, D. M. (ed.) IRL Press, Oxford, pp. 49–78.
Rieber et al. (1986) in *Leukocyte Typing II,* vol. 1, pp. 233–242.
Kawata et al. (1984) J. Exp. Med. 160:633–651.
Seed et al. (1987) Proc. Natl. Acad. Sci. USA 84:3365–3369.
Palker et al. (1985) in *Leukocyte Typing II,* Spring–Verlag, New York, pp. 303–313.
Lazarovits et al. (1987) in *Leukocyte Typing III,* McMichael (ed.), Oxford University Press, Oxford, pp. 219–223.
Sandrin et al. (1987) in *Leukocyte Typing III,* McMichael (ed.), Oxford University Press, Oxford, pp. 216–219.
Valentine et al. (1987) in *Leukocyte Typing III,* McMichael (ed.), Oxford University Press, Oxford, pp. 440–443.
Rothlein et al. (1987) Exp. Med. 163:1132–1149.
Hynes, R. O. (1987) Cell 48:549–554.
Williams, A. F. (1987) Immunol. Today 8:298–303.
Aruffo, A. and Seed, B. (1987) Proc. Natl. Acad. Sci. 84:8573–8577.
P.N.A.S. 75:2844–48, Jun. 1978, Wysocki et al. Panning for Lympocytes: A Method for Cell Selection.
Nature 330:379–81, 26 Nov. 1987, Hadisen et al Expression Cloning at CDNA Sequently of the Nat+/Glucose co–transporter.
McMichael et al. (1987) *Leukocyte Typing III, White Cell Differentiation Antigens,* McMichael (ed.) Oxford University Press, pp. 31–62.
Aruffo, A. and Seed, B. (1987) EMBO J. 6:3313–3316.
Seed, B. (1987) Nature 329:840–842.
Simmons et al. (1988) Nature 331:624–627.
Sleckman et al. (1987) Nature 328:351–353.
Simmons, D. and Seed, B. (1988) Nature 333:568–570.
Stuve et al. (1987) J. Virol. 61:327–335.
Oshima et al. (1987) Proc. Natl. Acad. Sci. 84:685–689.
Gerald et al. (1986) J. Gen. Virol. 67:2695–2703.
Bernstein et al. (1982) J. Immunol. 128:876–881.
Tandon et al. (1989) J. Biol. Chem. 264:7570–7575.
Ockenhouse et al. (1989) Science 243:1469–1471.
Allen, J. M. and Seed, B. (1989) Science 243:378–381.
Stengelin et al. (1988) EMBO J. 7:1053.
Andrews et al. (1984) in *Leukocyte Typing,* pp. 398–404.
Johnson et al. (1986) Cell 47:545–554.
Seigelman et al. (1989) Science 243:1165–1172.
Lasky et al. (1989) Cell 56:1045–1055.
Hotta et al. (1988) Cancer Res. 48:2955.
Seigelman, M. and Weissman, I. (1989) Proc. Natl. Acad. Sci. USA 86:5562–5566.
Tedder et al. (1989) J. Cell Biol. 170:123–133.
Bowen et al. (1989) J. Cell Biol. 109:421–427.
Allen, J. M. and Seed, B. (1988) Nuc. Acids Res. 16:11824.Dang, L. & Rock, K. (1991) J. Immunol. 146:3273–9.
Ross, L. et al. (1992) J. Biol. Chem. 267:8537–43.
Hibbs, M. et al. (1991) Science 251:1611–3.
Berendt, A. et al. (1992) Cell 68:71–81.
Ockenhouse, C. et al. (1992) Cell 68:63–9.
Diamond, M. et al. (1991) Cell 65:961–71.
Cabanas, C. & Hogg, N. (1991) FEBS Lett 292:284–8.
Staunton, D. et al. (1990) Cell 61:243–54 (errata at Cell (1990) 61:1157 and Cell (1991) 67:1312).
Piela–Smith, T. et al. (1992) J. Immunol. 148:1375–81.
Greve, J. et al. (1989) Cell 56:839–47.
Staunton, D. et al. (1992) J. Immunol. 148:3271–4.
Register, R. et al. (1991) J. Virol. 65:6589–96.
Greve, J. et al. (1991) J. Virol. 65:6015–23.
Lineberger, D. et al. (1992) Virus Res. 24:173–86.
Oppenheimer–Marks, N. et al. (1991) J. Immunol. 147:2913–21.
Perry, M. et al. (1992) Cell Tissue Res. 268:317–26.

(List continued on next page.)

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[57] **ABSTRACT**

A simple and highly efficient method for cloning cDNAs from mammalian expression libraries based on transient expression in mammalian host cells has been discovered. Novel expression vectors allowing highly efficient construction of mammalian cDNA libraries are disclosed. The cloning method of the invention which has been used to clone genes for cell surface antigens of human lymphocytes, has general application in gene cloning. Cell surface antigens cloned according to the present invention have been purified, and the nucleotide and amino acid sequences determined. These antigens have diagnostic and therapeutic utility in immune-mediated infections in mammals, including humans.

**16 Claims, 32 Drawing Sheets**