

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

SCHEDULE 13G

Under the Securities Exchange Act of 1934
(Original Filing)*

TARGACEPT, INC.

(Name of Issuer)

COMMON STOCK

(Title of Class of Securities)

87611R306

(CUSIP Number)

DECEMBER 31, 2009

(Date of Event Which Requires Filing of this Statement)

Check the appropriate box to designate the rule pursuant to which this Schedule is filed:

- Rule 13d-1(b)
 Rule 13d-1(c)
 Rule 13d-1(d)

*The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter the disclosures provided in a prior cover page.

The information required in the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

CUSIP No. 87611R306

1. Names of Reporting Persons.
I.R.S. Identification Nos. of above persons (entities only).
Sectoral Asset Management Inc.

2. Check the Appropriate Box if a Member of a Group (See Instructions)

- (a)
(b)

3. SEC Use Only

4. Citizenship or Place of Organization:
Canada

Number of Shares Beneficially Owned by Each Reporting Person With

5. Sole Voting Power
1,075,487

6. Shared Voting Power
-0-

7. Sole Dispositive Power
1,464,412

8. Shared Dispositive Power
-0-

9. Aggregate Amount Beneficially Owned by Each Reporting Person
1,464,412

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions).

11. Percent of Class Represented by Amount in Row (9)
5.3%

12. Type of Reporting Person (See Instructions)
IA

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CUSIP No. 87611R306

1. Names of Reporting Persons.
I.R.S. Identification Nos. of above persons (entities only).
Jérôme G. Pfund

2. Check the Appropriate Box if a Member of a Group (See Instructions)

(a)

(b)

3. SEC Use Only

4. Citizenship or Place of Organization:
Swiss

5. Sole Voting Power
1,075,487

Number of
Shares
Beneficially
Owned by
Each
Reporting
Person With

6. Shared Voting Power
-0-

7. Sole Dispositive Power
1,464,412

8. Shared Dispositive Power
-0-

9. Aggregate Amount Beneficially Owned by Each Reporting Person
1,464,412

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions).

11. Percent of Class Represented by Amount in Row (9)
5.3%

12. Type of Reporting Person (See Instructions)
IN

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1. Names of Reporting Persons.
I.R.S. Identification Nos. of above persons (entities only).
Michael L. Sjöström

2. Check the Appropriate Box if a Member of a Group (See Instructions)

(a)

(b)

3. SEC Use Only

4. Citizenship or Place of Organization:
Swiss

5. Sole Voting Power
1,075,487

Number of
Shares
Beneficially
Owned by
Each
Reporting
Person With

6. Shared Voting Power
-0-

7. Sole Dispositive Power
1,464,412

8. Shared Dispositive Power
-0-

9. Aggregate Amount Beneficially Owned by Each Reporting Person
1,464,412

10. Check if the Aggregate Amount in Row (9) Excludes Certain Shares (See Instructions).

11. Percent of Class Represented by Amount in Row (9)
5.3%

12. Type of Reporting Person (See Instructions)
IN

Item 1.

(a) Name of Issuer:
Targacept, Inc.

(b) Address of Issuer's Principal Executive Offices:
200 East First Street, Suite 300, Winston-Salem, NC 27101, USA

Item 2.

(a) Name of Person(s) Filing:
Sectoral Asset Management Inc.
Jérôme G. Pfund
Michael L. Sjöström

(b) Address of Principal Business Office or, if none, Residence:

The principal business address of each person filing is:
2120-1000 Sherbrooke St. West Montreal PQ H3A 3G4 Canada

- (c) Citizenship:
Sectoral Asset Management Inc. is a Canadian corporation
Jérôme G. Pfund is a Swiss citizen
Michael L. Sjöström is a Swiss citizen
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- (d) Title of Class of Securities:
Common Stock
-
- (e) CUSIP Number:
87611R306
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Item 3. If this statement is filed pursuant to §§240.13d-1(b) or 240.13d-2(b) or (c), check whether the person filing is a:

- (a) Broker or dealer registered under section 15 of the Act (15 U.S.C. 78o).
- (b) Bank as defined in section 3(a)(6) of the Act (15 U.S.C. 78c).
- (c) Insurance company as defined in section 3(a)(19) of the Act (15 U.S.C. 78c).
- (d) Investment company registered under section 8 of the Investment Company Act of 1940 (15 U.S.C 80a-8).
- (e) An investment adviser in accordance with §240.13d-1(b)(1)(ii)(E);
- (f) An employee benefit plan or endowment fund in accordance with §240.13d-1(b)(1)(ii)(F);
- (g) A parent holding company or control person in accordance with §240.13d-1(b)(1)(ii)(G);
- (h) A savings associations as defined in Section 3(b) of the Federal Deposit Insurance Act (12 U.S.C. 1813);
- (i) A church plan that is excluded from the definition of an investment company under section 3(c)(14) of the Investment Company Act of 1940 (15 U.S.C. 80a-3);
- (j) A non-U.S. institution in accordance with § 240.13d-1(b)(1)(ii)(J);
- (k) Group, in accordance with § 240.13d-1(b)(1)(ii)(K). If filing as a non-U.S. institution in accordance with § 240.13d-1(b)(1)(ii)(J), please specify the type of institution: _____

CUSIP No. 87611R306

Item 4. Ownership.

Sectoral Asset Management Inc., in its capacity as an investment adviser, has the sole right to dispose of or vote the number of shares of common stock of the Issuer set forth in this filing. Jérôme G. Pfund and Michael L. Sjöström, together, hold majority of shares of Sectoral Asset Management Inc. Sectoral Asset Management, Inc. and Messrs. Pfund and Sjöström disclaim beneficial ownership of the Issuer's common stock held by Sectoral Asset Management Inc.

- (a) Amount beneficially owned:
Sectoral Asset Management Inc.: 1,464,412 shares
Jérôme G. Pfund: 1,464,412 shares
Michael L. Sjöström: 1,464,412 shares
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- (b) Percent of class:
Sectoral Asset Management Inc.: 5.3%
Jérôme G. Pfund: 5.3%
Michael L. Sjöström: 5.3%
-
- (c) Number of shares as to which the person has:
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- (i) Sole power to vote or to direct the vote:
Sectoral Asset Management Inc.: 1,075,487 shares
Jérôme G. Pfund: 1,075,487 shares
Michael L. Sjöström: 1,075,487 shares
-
- (ii) Shared power to vote or to direct the vote:
Sectoral Asset Management Inc.: -0- shares
Jérôme G. Pfund: -0- shares
Michael L. Sjöström: -0- shares
-
- (iii) Sole power to dispose or to direct the disposition of:

Sectoral Asset Management Inc.: 1,464,412 shares
Jérôme G. Pfund: 1,464,412 shares
Michael L. Sjöström: 1,464,412 shares

- (iv) Shared power to dispose or to direct the disposition of:
Not applicable.
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Item 5. Ownership of Five Percent or Less of a Class.

If this statement is being filed to report the fact that as of the date hereof the reporting person has ceased to be the beneficial owner of more than five percent of the class of securities, check the following

Item 6. Ownership of More than Five Percent on Behalf of Another Person.

Various persons, as investment advisory clients of Sectoral Asset Management, Inc., have the right to receive or the power to direct the receipt of dividends from, or the proceeds from the sale of, the common stock of the Issuer. To the knowledge of Sectoral Asset Management, Inc., no one such person's interest in the common stock of the Issuer is more than five percent of the total outstanding common stock of the Issuer.

Item 7. Identification and Classification of the Subsidiary Which Acquired the Security Being Reported on By the Parent Holding Company or Control Person.

Not applicable.

Item 8. Identification and Classification of Members of the Group.

Not applicable.

Item 9. Notice of Dissolution of Group.

Not applicable.

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CUSIP No. 87611R306

Item 10. Certification.

By signing below the undersigned each certifies that, to the best knowledge and belief of the undersigned, the securities referred to above were acquired and are held in the ordinary course of business and were not acquired and are not held for the purpose of or with the effect of changing or influencing the control of the issuer of the securities and were not acquired and are not held in connection with or as a participant in any transaction having that purpose or effect.

SIGNATURE

After reasonable inquiry and to the best knowledge and belief of each of the undersigned, the undersigned certify that the information set forth in this statement is true, complete and correct.

Dated: February 5, 2010

SECTORAL ASSET MANAGEMENT INC.

/s/Jérôme G. Pfund

By: Jérôme G. Pfund

Its: CEO

Dated: February 5, 2010

/s/Jérôme G. Pfund

Jérôme G. Pfund

Dated: February 5, 2010

/s/Michael L. Sjöström

Michael L. Sjöström

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Each of the undersigned, pursuant to Rule 13d-1(k)(1) under the Securities Exchange Act of 1934, as amended, hereby agrees that only one statement containing the information required by Schedule 13G needs be filed with respect to the ownership by each of the undersigned of the shares of common stock of Targacept, Inc., and that the Schedule 13G to which this Agreement is appended as Exhibit A is to be filed with the Securities and Exchange Commission on behalf of each of the undersigned on or about the date hereof.

EXECUTED as a sealed instrument this 5th day of February 2010.

SECTORAL ASSET MANAGEMENT INC.

/s/Jérôme G. Pfund

By: Jérôme G. Pfund

Its: CEO

/s/Jérôme G. Pfund

Jérôme G. Pfund

/s/Michael L. Sjöström

Michael L. Sjöström